INSAR Mission Statement
To promote the highest quality autism research.

INSAR’S VALUES

BUILDING IDENTITY
Promote INSAR as the globally recognized and inclusive society for autism researchers

DIVERSE AND GLOBAL
Represent and serve a diverse and global community.

INTERDISCIPLINARY AND TRANSLATIONAL
Cultivate interdisciplinary and translational research, public-private partnerships, and relationships with industry.

NEXT GENERATION
Foster opportunities for leadership and career development for a diverse next generation of autism researchers.

PARTNERSHIPS
Foster understanding, communication, and collaboration between autism researchers and people affected by autism.

RESEARCH TO PRACTICE
Disseminate scientific knowledge to inform research priorities, policy, practice, and public understanding.

SETTING THE BAR
Increase the quality, diversity, and relevance of research promoted through annual meetings, journal, educational, and other year-round activities.

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## KEYNOTE — INVITED, KEYNOTE SPEAKERS, AWARDS

### 101 - Autism: One Name for a Wide Spectrum
**Keynote Speaker: Wendy Chung**

*(Keynote)* Autism: One Name for a Wide Spectrum  
**W. K. Chung**, Department of Pediatrics, Columbia University, New York, NY

Autism represents a wide spectrum of manifestations that differ between individuals and along the life course. Developing the evidence necessary to identify ways to support individuals with autism requires greater homogeneity of subsets of individuals with autism and tailoring of supports to the individuals. SPARK and Simons Searchlight are large cohorts of individuals with autism and genetic neurodevelopmental conditions, respectively. These studies are connecting participants with researchers to more efficiently and effectively understand autism, the brain, and human behavior and to identify the molecular basis for these differences.

### 103 - Adapting and Innovating: A Model of Care for Low Resource Settings
**Keynote Speaker: Gauri Divan**

*(Keynote)* Adapting and Innovating: A Model of Care for Low Resource Settings  
**G. Divan**, Child Development Group, Sangath, New Delhi, India

This lecture will describe the journey taken by Sangath, a not-for profit in India, to realize the goal of universal health care for young children with autism in low-resource settings that have limited specialty services. Sangath started as a child development centre in Goa, a western state of India, designing its services as a traditional multi-disciplinary team based on high-income country models of ideal care. The early experiences of clinicians and families pushed the team to consider how they could enhance the coverage of evidence-based interventions in the context of the many barriers to these centre based models of care. Sangath then embarked on a journey to understand these barriers of access by iteratively adapting, expanding and evaluating a multi-component parent-mediated communication intervention which could be delivered in community settings by non-specialist providers. This body of work has set the stage for a major initiative to scale-up the intervention in the entire region, guided by the principles of universal health coverage for young children with autism.

### 104 - Plenary Roundtable Discussion: Precision Health for Neurodiverse Communities
**Panel Chair: T. Bourgeron, Institut Pasteur, Paris, France**

**Panelists:**  
Emily Jones, Centre for Brain and Cognitive Development, Birkbeck University of London, London, United Kingdom  
M. Doherty, Autistic Doctors International, Navan, Ireland  
V. K. Jaswal, University of Virginia, Charlottesville, VA  
J. A. Eccles, Brighton and Sussex Medical School, Brighton, United Kingdom

*(Keynote)* Precision Health for Neurodiverse Communities  

Over the past decade, two approaches have substantially influenced autism research – the neurodiversity paradigm and precision medicine/precision healthcare. Whereas some view these two approaches as opposite ends, others embrace them as inherently synergistic due to their shared focus on the diversity among autistic people, and the need to tailor support to individual characteristics, needs and preferences. The goal of this Roundtable discussion is to explore what neurodiversity approaches and precision healthcare approaches have in common for panelists, where they differ, the challenges of either approach, and how they could be addressed.
We welcome five panelists who directly work on aspects of precision health and/or within a neurodiversity affirmative framework, bring first and/or second person lived experience to the table, and together cover a broad spectrum of interests and support needs from infants and young children over minimally-verbal autistic individuals to eloquent autistic self-advocates. Prof Thomas Bourgeron is a geneticist at the Institut Pasteur, Paris, who first linked a rare mutation in a single gene with common forms of autism. He leads a new consortium aimed at co-designing genetic research with autistic people. Prof Emily Jones is a cognitive developmental neuroscientist at Birkbeck University, London. She uses multi-modal approaches to improve early detection and identify appropriate targets for intervention. Dr Mary Doherty is an autistic physician and mother to autistic children, as well as founder of the peer support and self-advocacy group Autistic Doctors Internationally. Both Profs Bourgeron and Jones are Principle Investigators of AIMS-2-TRIALS, which is currently the largest consortium dedicated to the development of precision medicine for autism in the world. Dr Doherty serves as one of the group’s Autism-Representatives. Prof Vikram Jaswal is a psychologist at Virginia University with a research focus on communication in non-speaking and minimally-speaking autistics, and a family member of a non-speaking autistic person. Dr Jessica Eccles is a Senior Clinical Academic Psychiatrist at Brighton and Sussex Medical school. She is part of a neurodiverse research team focused on brain-body interactions.

The Roundtable will discuss how neurodiversity and precision medicine frameworks ensure that different autistic people’s needs are heard and included in decisions. It will probe panelists directly working on precision healthcare to what extent insights or challenges from the neurodiversity paradigm and/or movement have impacted their own research. Conversely, it asks panelists about priorities from different neurodivergent communities and how they have been (or could be) picked up by researchers. The format of the roundtable invites one panelist to initially respond to a topic and then gives other panelists the possibility to respond. We acknowledge that the views of panelists are examples only that cannot represent all perspectives. Instead, it is hoped that this Roundtable on one of the most timely topics in current autism research will inspire more dialogues and discussion among INSAR delegates.

KEYNOTE — INVITED, KEYNOTE SPEAKERS, AWARDS

105 - Ageing with Autism: Facts, Fallacies and Future Directions
Keynote Speaker: Patricia Howlin

(Keynote) Ageing with Autism: Facts, Fallacies and Future Directions
P. Howlin, King's College London, London, United Kingdom

Although, until relatively recently, there were very few studies involving autistic adults, especially older adults, the last decade or so has witnessed an upsurge in adult autism research. Most of this research has focussed on the difficulties many autistic adults experience in the transition from adolescence into early-to-mid adulthood, and on the lack of support networks to help them achieve their goals in life. In the present talk I will review recent studies of outcome in adulthood, involving both longitudinal and cross-sectional cohorts in Europe, UK and Australia. I will focus particularly on trajectories from mid to later adulthood with respect to social functioning, mental health and quality of life.

However, it is important to recognise that much of this work has been conducted from a “neurotypical” perspective, with judgements of what constitutes a “good” outcome based on criteria that are not endorsed by many autistic adults themselves. Indeed, some of the subjective, qualitative data we have collected present a rather different picture of adult lives compared with the “objective” results from quantitative studies.

Thus, as well as attempting to summarise the advances that have been made in understanding the experiences of autistic people as they move through adulthood, I will try to address ways in which research in this area needs to be improved in order to meet the very differing needs and expectations of all in the wider autism community.

Adult Outcome: Medical, Cognitive, Behavioral

PANEL DISCUSSION — ADULT OUTCOME: MEDICAL, COGNITIVE, BEHAVIORAL

219 - Autistic Ageing: Cognitive Changes, Self-Perceptions, and Medication Profiles

Panel Chair: Carolien Torenvliet, Universiteit van Amsterdam, Amsterdam, Netherlands

Discussant: Francesca Happe, Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, UNITED KINGDOM

Research on ageing in autism is scarce, yet given the increased awareness of autism in middle, and late adulthood, and the uncertainties associated with ageing itself, it seems crucial to gain insights on the late life development of physical, mental, and cognitive health of
autistic people. Therefore, this panel highlights new findings on ageing in autism. Autistic people might be at risk for age-related disease, as research by Klein et al. (talk 1) indicate high rates (30%) of positive dementia screening, and elevated symptom endorsement in autistic adults. This might be moderated by medication use, as findings from O’Nions et al. (talk 2) suggest increased prescription rates for mental health medication in autistic adults, especially at older age. However, cognitive findings are contradictory, as self-report data by Charlton et al. (talk 3) show high rates of prospective, and retrospective memory difficulties in (older) autistic adults, yet longitudinal data by Torenvliet et al. (talk 4) suggests that cognitive performance does not deteriorate more rapidly in autistic than non-autistic adults. Most likely, age-related changes in autism are heterogeneous, with large individual differences. By contrasting different data sources, our panel aims to unravel if and why ageing in autism may be particularly burdensome.

### 219.001 (Panel Discussion) Self-Reported Cognitive Decline Among Middle and Older Age Autistic Adults


**Background:** Very little is known about autistic adults as they age. Early evidence suggests a potentially high risk for dementia and atypical cognitive decline in autistic middle and older age adults. Research in the general population indicates that self-reported cognitive decline may predict future dementia earlier than performance-based measures. Nevertheless, self-report dementia screeners have not been used to date in autism research.

**Objectives:** We aimed to: 1) describe the rates and profiles of self-reported cognitive decline, 2) examine associations of age, sex designated at birth, and autistic traits with self-reported cognitive decline, and 3) document the psychometrics of one self-report measure of cognitive decline (i.e., the AD8; Galvin et al., 2007) in a sample of autistic adults.

**Methods:** Participants included 210 middle and older age autistic adults (mean age=55.63, range=42-81 years, 58% female; Table 1) recruited through SPARK Research Match. Participants completed self-report on the following: a dementia screener (AD8), autistic traits (AQ28; Hoekstra et al., 2011), and current memory problems (PRMQ; Smith et al., 2000). We examined whether age, sex, or autistic traits were related to screening positive vs. negative for likely cognitive decline on the AD8 (higher-threshold cutoff ≥2; recommended self-report cutoff ≥1). Cronbach’s alpha and Pearson’s correlations were used to examine AD8 reliability and convergent validity (PRMQ), respectively.

**Results:** We found high rates of cognitive decline with 30% and 49% of the sample screening positive using a higher-threshold cutoff (≥2 items endorsed) and the conventional self-report cutoff (≥1 items endorsed), respectively. The patterning of AD8 symptom endorsement observed in the autistic adults paralleled that observed in a population-based sample in the USA (See Figure 1; Passler et al., 2021). For example, declining interest in leisure activities and everyday problems with thinking, memory, and judgment were the most commonly endorsed symptoms, while forgetting the month or year was the least common symptom in both groups. However, the rate of symptom endorsement was elevated in autistic adults (30%) compared to the population-based sample (23%). There was evidence that autistic individuals designated female at birth may be more vulnerable to cognitive decline with 54% of females and 40% of males screening positive when a cutoff of ≥1 was used (X²(1, N=210)=3.62; p=.057). Reports of cognitive decline did not vary by age (r=-.02, p=.73), with younger and older adults equally reporting cognitive decline. Modestly elevated autistic traits were found in those screening positive vs. negative for cognitive decline (cutoff ≥1: t(207)=1.65, p=.05, d=.23; cutoff ≥2: t(207)=3.12, p=.001, d=.47). Finally, the psychometrics of the dementia screener were good (Cronbach’s alpha=.84), including convergent validity with an independent measure of current memory problems (r=.49, p<.001).

**Conclusions:** Overall, findings showed high rates (30%) of self-reported cognitive decline among middle and older age autistic adults. The symptom pattern mirrors the general population, but autistic adults showed higher rates of symptom endorsement. These results could signal an emerging public health crisis in autistic adults as they age, and support the potential utility of self-report measures for early screening for cognitive decline in this population.

### 219.002 (Panel Discussion) Age Differences in Mental Health Prescribing to Autistic People: A Matched UK Cohort Study


**Background:** Autistic people have more mental health diagnoses and receive more psychotropic medications than non-autistic people. However, it is not clear how psychotropic prescribing differs related to age, sex, and co-occurring intellectual disability within the autistic population in the UK, and whether prescribing trends follow those seen in the non-autistic population.
Objectives: The aim of this study was to investigate in a large, representative national sample, the rates of psychotropic prescribing in 2018 across different age-bands in UK autistic males and females with and without intellectual disability (ID) to explore prescribing differences within the autistic population, and to see whether prescribing in autistic people follows population-level trends. Looking at data from 2000 to 2018, we also aimed to explore if prescribing in autistic people is motivated by similar presenting concerns compared to the general population, stratifying results by age.

Methods: A retrospective matched cohort study of prospectively collected anonymised UK primary care data from the IQVIA medical research database (IMRD). Data for 2018 were available for 9,601 autistic people without ID and 46,028 matched comparison people; plus 1,772 autistic people with ID and 8,990 matched comparison people. Data between 2000-2018 were available for 21,450 autistic people without ID and 101,077 matched comparison people, plus 5,032 autistic people with ID and 24,803 matched comparison people.

Results: Distinct patterns of prescribing related to age were observed in autistic people with and without ID. Whilst younger autistic people tend to receive stimulants and melatonin, few older autistic people received these medications. Instead, they received more antipsychotics, hypnotics other than melatonin, anxiolitics, anti-epileptics, and antidepressants. The greatest difference for autistic over 50s vs. their matched non-autistic comparison groups during 2018 was for antipsychotics, which were prescribed to autistic males without ID 9 times as often, autistic females without ID 13 times as often, autistic males with ID 23 times as often, and autistic females with ID 38 times as often vs. their matched comparison groups. Autistic people were more likely to receive medication without a common mental health indicator in their records (e.g. antipsychotics without a record of severe mental illness (SMI)). Between 2000 and 2018, autistic adults aged 50+ without ID who did not have an SMI record were 39 times as likely, and autistic adults aged 50+ with ID 136 times as likely to receive antipsychotics in a given year vs. people in their respective comparison groups without SMI.

Conclusions: The findings suggest substantial age-related differences in prescribing among autistic people. Much higher use of antipsychotics in older autistic vs. comparison people, particularly in those with ID, could reflect over-prescribing. Some diagnosed older autistic people may also have more complex mental health needs, and/or atypical presentations of mental health challenges, leading to differences in diagnostic coding. These findings should be viewed in the light of evidence that at least nine out of 10 UK autistic over-50s are undiagnosed: those diagnosed likely have more complex needs than autistic people on average.

219.003 (Panel Discussion) Self-Reported Prospective and Retrospective Memory Among Middle Aged and Older Autistic and Non-Autistic People

Background: Research often demonstrates poorer memory among autistic adults compared to non-autistic comparison groups. Difficulties have been observed in retrospective (recalling information, RM) and prospective (remembering to perform a future action, PM) memory. However, few studies have explored these abilities in middle-aged or older autistic people, or have considered individuals’ self-perceived memory difficulties. Although performance on both PM and RM tasks declines with older age (in the general population), age-effects are not commonly observed on self-report measures. On self-rated memory measures, people may compare their own memory functioning to similar age peers, therefore reducing age-associations.

Objectives: Explore self-rated RM and PM abilities in middle-aged and older autistic people, including age-effects, and compare these abilities to an age and education matched non-autistic comparison group.

Methods: 350 autistic adults (58% assigned female at birth) aged 40-83 years, were recruited via Simons Foundation Powering Autism Research (SPARK) research match. To provide a comparison group, a publicly available dataset was leveraged from a study run in collaboration with the British Broadcasting Corporation (BBC), including 408,938 participants. BBC data were filtered and a sample of 350 people matched as closely as possible on age, birth-sex and education level was retained. In both samples, individuals completed the Prospective and Retrospective Memory Questionnaire (PRMQ) which includes memory questions about PM-vs-RM (memory type), cued-vs-uncued memory (cue), and short-vs-long delay (delay).

Results: An ANOVA examined differences between the SPARK (autistic) and BBC (non-autistic) groups, and effects of conditions (memory type, cue, delay) as well as their interactions. A main effect of group was observed with the autistic group reporting more memory difficulties than the non-autistic group (F=29.22, p<.001). Significant main effects were also observed for memory type (F=357.19, p<.001, more PM difficulties), cue (F=360.38, p<.001, more uncued difficulties) and delay (F=213.78, p<.001, more short delay difficulties). No interactions between group and memory type, cue or delay were observed.

A significant correlation was observed between age and total PRMQ score, for the autistic group (r=-0.18, p<.001) but not the non-autistic group (r=0.015, p=.78). Separate correlational analyses were run for each memory type. Autistic people reported significantly more prospective (r=-0.18, p<.001) and retrospective (r=-0.16, p<.001) memory problems with older age; whereas no age associations were observed for non-autistic people (prospective memory, r=0.017, p=.76; retrospective memory, r=0.047, p=.38). Differences in correlations were statistically significant (prospective: z=-2.17, p=.03; retrospective: z=-2.75, p=.006).
Conclusions: Autistic middle-aged and older people reported more memory difficulties than non-autistic people of similar age and education level. No significant interactions were observed between group and any of the memory-related conditions. Among autistic people poorer RM and PM was associated with older age, whereas age-effects were not observed among non-autistic people. Self-reported memory difficulties are important as they are often associated with poorer performance on cognitive tests and everyday difficulties. Results suggest that autistic people may be at increased risk for memory problems as they age, compared to non-autistic people. Further studies are required to explore the association between self-reported memory and performance on memory tasks among autistic older people.

219.004 (Panel Discussion) Cognitive Ageing in Adults with Autism
C. Torenvliet, A. P. Groenman, T. A. Radhoe, J. Agealink van Rentergem, W. J. van der Putten and H. M. Geurts, (1)Universiteit van Amsterdam, Amsterdam, Netherlands, (2)University of Amsterdam, Amsterdam, Netherlands, (3)Leo Kannerhuis, Amsterdam, Netherlands, (4)Leo Kannerhuis, Parnassia Group, Amsterdam, Netherlands

Background: Cognitive data on ageing in autism is scarce, and studies are often underpowered. Our previous cross-sectional work, however, does not indicate evidence for differential age-related cognitive effects in autism, in two large independent samples (n\textsuperscript{total}=204, n\textsuperscript{total no autism}=204). However, as this study used cross-sectional cognitive performance data, findings might be clouded by cohort effects. Furthermore, individuals could have used different strategies to come to the same test scores. To gain further insight in cognitive ageing in autism we need well-powered longitudinal studies, and/or more detailed studies on cognitive ageing in autism.

Objectives: We conducted a series of studies in which we investigated cognitive ageing in a large sample of autistic and non-autistic adults between 24 and 85 years.

Methods: Multilevel analyses were conducted to compare 128 autistic adults to 112 non-autistic adults over two to three timepoints (average time interval: 3.5 years). Participants were tested on a wide range of cognitive tasks (k=15) measuring verbal memory, visual (working) memory, prospective memory, theory of mind, fluency, response speed, inhibition, planning, and switching. Using a new Bayesian method, we compared models with- and without a group difference (autism/no autism) in age-related decline. Furthermore, we are currently collecting data (n=100) by which we aim to investigate cognitive strategies in younger, and older (autistic) adults. These comparisons might give us more detailed insights in how autistic people approach cognitive tasks, whether this is different at older age, and if age-related effects are different compared to non-autistic people.

Results: Our longitudinal results indicate that the used task battery was sensitive in detecting both cross-sectional age-related effects, and/or longitudinal changes across our sample, with worse performance at older age and/or later timepoints (Figure 1, left panels). However, in line with our cross-sectional results, age-related cognitive decline was not significantly different between those with- and without autism (p’s > .233, see Figure 1, right panel). Bayesian analyses confirmed that evidence was mostly in favor of a model that specified no differences in age-related decline between those with- and without autism (BF\textsubscript{01’s} > 28). Next to these results, at INSAR 2023, we will present our data on cognitive strategies, providing further insight on whether the underlying cognitive strategies are also similar between those- with and without autism, or that individuals with autism may come to the same cognitive test scores by using different approaches.

Conclusions: These data suggest that, at group level, autistic individuals do not seem particularly vulnerable for cognitive decline. However, based on the known heterogeneity in autism, it may be likely that some autistic adults are more vulnerable for accelerated cognitive decline than others. Detailed information on which cognitive strategies are used, might enable us to further theorize on if, and how cognitive differences in autism arise, and whether this is likely to result in either risks or resilience regarding cognitive ageing.

PANEL DISCUSSION — ADULT OUTCOME: MEDICAL, COGNITIVE, BEHAVIORAL
228 - Obstetric Care and Pregnancy Experiences Among Autistic People

Panel Chair: Jessica Rast, A.J. Drexel Autism Institute, Drexel University, Philadelphia, PA
Discussant: Dena Gassner, Social Work, Towson University, West Hempstead, NY

Pregnancy and childbirth carry a multitude of biological and social changes associated with short and long-term health and well-being. For autistic people, pregnancy can bring increased sensory hypersensitivity, feelings of low self-advocacy in obstetric care, and mental health exacerbations. Early evidence also suggests autistic pregnant people may be at higher risk of pregnancy complications, including pre-eclampsia and preterm birth. However, the obstetric profiles of autistic people remain largely understudied. This panel will explore autism and pregnancy across multiple countries, healthcare settings, and research methods. The first two presentations will consider pregnancy among autistic people in the United States, including one analysis of a sample with Medicaid public insurance and a second analysis among a sample with a mix of private and public health insurance. The third presentation will discuss pregnancy outcomes among autistic and non-autistic people in Sweden. The fourth presentation will focus on a qualitative analysis of perinatal mental health in autistic people in
Background: Previous studies have shown that women with disabilities are at increased risk of experiencing certain negative pregnancy outcomes, including preterm birth and low birthweight, and receive a relative lack of preconception care. However, very little is known about the experiences of autistic women during pregnancy. What little is known about reproductive health in autistic women suggest they have reduced access to preventive care. Further, autistic people generally have higher rates of co-occurring mental and physical health conditions than their peers without autism that may place autistic women at increased risk for adverse pregnancy and delivery outcomes.

Objectives: The purpose of this study was to examine the pregnancy experiences of autistic women in Sweden, including health service use, maternal health conditions during pregnancy, and delivery outcomes.

Methods: We used the Swedish Medical Birth Register to identify all pregnancies in Sweden between 2014 and 2020. Autistic women were identified by pre-existing diagnosis of autism (N=4420) 1987-2021 in the National Patient Register. We included a comparison group of women without autism (N=791,800). We examined presence of certain health conditions during pregnancy and delivery outcomes by group. We will expand the analysis to include further obstetric outcomes, and additionally investigate discrepancies in antenatal care and methods of delivery, if accepted. We will also explore stratification by intellectual disability.

Results: Autistic women were more likely than non-autistic women to have certain health conditions during pregnancy that put them and their fetus at increased risk for adverse outcomes, including diabetes (1.7% versus 0.9%) and obesity (24.6% versus 14.7%). They were also more likely to have preeclampsia (4.8% versus 3.1%) and gestational diabetes (2.8% versus 2.3%).

There were a few differences in delivery outcomes as well. Autistic women were more likely to have premature delivery (before 37 weeks) (7.7% versus 5.4%). Small for gestational age births were similar across groups although slightly higher in autistic women (2.7% versus 2.3%), and Apgar scores below seven at five minutes were slightly common in autistic women (2.4% versus 1.4%).

Conclusions: Findings suggest that autistic women who become pregnant had increased rates of several characteristics and health conditions that may place their pregnancy at higher risk; they were more likely to have diagnoses of pregnancy-related health conditions; and they had a higher rate of premature delivery. Autistic women may need better care before and during pregnancy, including access to contraceptive care, to reduce risk and increase maternal and fetal health.

Background: The literature examining pregnancy experiences among autistic people is small. However, it suggests that autistic people may be at higher risk of gestational complications, such as pre-eclampsia and pre-term birth compared to non-autistic peers. Further, autistic people have reported traumatic experiences in healthcare overall, including obstetric care. There is a paucity of descriptive epidemiology on pregnancy in autistic people in the United States, including characterization of their prenatal care utilization and obstetric risks.

Objectives: To describe obstetric care utilization and obstetric health outcomes in a sample of pregnant autistic people in the US.

Methods: Our study took place at Kaiser Permanente Northern California (KPNC), a large, integrated healthcare delivery system. Among KPNC members with a clinician-documented diagnosis of autism, we identified all pregnancies with outcomes that occurred between January 2011 and July 2022. From electronic health records, we additionally extracted information on sociodemographic factors, health diagnoses during pregnancy, birth outcomes, and quality indicators of obstetric care utilization, including timing of the first prenatal care appointment and routine prenatal screenings. Perinatal depression was assessed through a combination of a) clinical diagnosis of depression in the two years preceding the pregnancy through the first 12 months of the postpartum period and b) scores indicative of moderate/severe depression symptoms on the PHQ-9, a validated screener for depression that is regularly administered throughout prenatal and postpartum care.
Results: Between 2011-2022, there were 161 pregnancies among 121 autistic individuals. The average age of pregnancy onset was 25.6 years (standard deviation: 6.0 years). The sample was 59% White, non-Hispanic; 19% Hispanic; 12% Black; 5% Asian; and 6% multiracial or another race/ethnicity. Most pregnant individuals had private health insurance (71%). Gestational complications were relatively common, with 23% of pregnant individuals receiving a diagnosis of gestational hypertension, followed by 10% pre-eclampsia, and 10% gestational diabetes. 32% of pregnant individuals had a diagnosis of depression in the two years before pregnancy onset. During pregnancy, the prevalence of depression increased to 65%. In the 12 months postpartum, the prevalence of depression was 39%.

Among these pregnancies, 91 (57%) ended in live birth, 47 (29%) ended in therapeutic abortion, and 23 (14%) ended in spontaneous abortion, ectopic pregnancy, or stillbirth. Among those delivering a live birth, 10% reported perinatal smoking, 16% initiated prenatal care after the first trimester, and 31% had delayed or missed screenings for gestational diabetes. The prevalence of preterm birth and low birthweight was 12% and 4% respectively.

Conclusions: The rate of perinatal smoking, delayed initiation of prenatal care, pre-eclampsia, gestational hypertension, and perinatal depression appear to be higher in this autistic sample than what has been reported in the general pregnant population of California. These results, while preliminary, suggest that the obstetric needs of autistic people, including the accessibility of prenatal care and support services for perinatal mental health, warrant more attention. Analyses will be updated in a larger sample of pregnancies occurring between 1997 and 2022 at KPNC and compared to a sample of non-autistic people with pregnancies during the same time period.

228.003  (Panel Discussion) Maternal Health Outcomes Among Autistic Birthing People
L. Shee and S. Tao, (1)A.J. Drexel Autism Institute, Philadelphia, PA, (2)Drexel University, Philadelphia, PA

Background: Identifying the experiences of birthing people is a critical component to understanding service gaps and improving maternal health outcomes. However, population-level information is needed to support the growing population of autistic individuals aging into childbearing years. A limited but expanding research base primarily utilizing qualitative methods has identified that suboptimal experiences are reported by autistic birthing people. Research using national registry data from Sweden found that autistic individuals who gave birth were more likely to be younger and to experience a range of adverse health outcomes across pregnancy, childbirth, and postpartum periods, including preeclampsia, preterm birth, and cesarean delivery, than their peers. Further efforts are urgently needed, especially among diverse populations, to identify if and how these findings are observed in other countries to help drive care improvements.

In the US, Medicaid insures more than half of births and is the largest behavioral health insurer in the nation, indicating that there are prime opportunities to identify and study the needs of autistic birthing people. Medicaid presents a unique opportunity to examine the experiences of a diverse group of autistic birthing people, large data sources are needed to examine population-level health outcomes in tandem with documenting and understanding the systems that provide their prenatal, childbirth and postpartum care. To refine and build services to support the needs of autistic birthing people, large data sources are needed to examine population-level health outcomes in tandem with documenting and understanding the lived experiences of this group. Medicaid presents a unique opportunity to examine the experiences of a diverse group of autistic birthing people to drive future research to support their needs.

Conclusions: Services and supports to meet the needs of autistic birthing people is an under researched area, to the detriment of the systems that provide their prenatal, childbirth and postpartum care. To refine and build services to support the needs of autistic birthing people, large data sources are needed to examine population-level health outcomes in tandem with documenting and understanding the lived experiences of this group. Medicaid presents a unique opportunity to examine the experiences of a diverse group of autistic birthing people to drive future research to support their needs.

228.004  (Panel Discussion) Autism and Prenatal Depression: Factors Influencing the Decision to Disclose Prenatal Depression to Healthcare Professionals
S. Hampton, E. M. Weir, P. C. Allison, S. Baron-Cohen, and R. Holt, (1)Department of Health Sciences, University of York, York, UNITED KINGDOM, (2)Autism Research Centre, Department of Psychiatry, Autism Research Centre - University of Cambridge, Cambridge, United Kingdom, (3)Autism Research Centre, Department of Psychiatry, University of Cambridge, Cambridge, United Kingdom

Objectives: This study examines the characteristics and health outcomes of autistic birthing people in a national sample of Medicaid-enrolled individuals.

Methods: National (US) Medicaid claims for 2016 for all enrolled autistic individuals aged 14 to 50 and similarly aged cohorts of individuals with intellectual disability (ID) and a random sample of Medicaid enrollees were constructed. Diagnoses of autism and ID were identified using validated algorithms from the Chronic Condition Warehouse (CCW) which have also been used in the majority of autism research to date. Childbirth was identified using a random protocol for claims data. Totals of 8,370 autistic birthing people, 30,900 birthing people with ID, and 383,068 other birthing Medicaid enrollees were identified.

Results: Autistic birthing people had the youngest age of first observed birth (mean age=21.87, SD 5.88 years) of the three groups (ID mean age=24.6, SD=6.87; other enrollees mean age=25.3, SD=6.3). More than one in four (28.8%) autistic birthing people were Black, compared to 35.9% of the ID group and 22.9% of the other enrollee group. Almost one-third of autistic birthing people were eligible due to poverty (29.3%), which was lower in the ID group (19.1%). Most autistic birthing people lived in urban areas (69.5%), although this was also common among birthing people with ID (71.6%) and other Medicaid enrollees (72.4%). With recently acquired data through 2019, longitudinal data will be updated across these characteristics, including medical conditions and co-occurring mental health diagnoses.

Conclusions: Services and supports to meet the needs of autistic birthing people is an under researched area, to the detriment of the systems that provide their prenatal, childbirth and postpartum care. To refine and build services to support the needs of autistic birthing people, large data sources are needed to examine population-level health outcomes in tandem with documenting and understanding the lived experiences of this group. Medicaid presents a unique opportunity to examine the experiences of a diverse group of autistic birthing people to drive future research to support their needs.
Background: Prenatal depression is an important public health concern due to its serious impact on both mother and child. There is growing evidence that autistic people are substantially more likely than non-autistic people to experience prenatal depression. As such, ensuring that autistic people have access to mental health support during pregnancy is vital. However, some autistic people report being reluctant to disclose personal information, such as their autism diagnosis, to professionals. There is no research exploring whether autistic people feel able to disclose prenatal depression to professionals and seek the support they require.

Objectives: This study aimed to explore the factors influencing autistic and non-autistic people’s decision whether to disclose prenatal depression to healthcare professionals.

Methods: An anonymous online survey was completed by 42 non-autistic respondents (mean age 37.99 years; SD = 8.78) and 91 autistic respondents (mean age 40.31 years; SD = 8.12). All respondents experienced depression during their most recent pregnancy. The autistic and non-autistic groups did not significantly differ on age, gender (100% of non-autistic and 91% of autistic participants identified as women), ethnicity (90% of non-autistic and 92% of autistic participants identified as white), education level (79% of non-autistic and 71% of autistic participants were university educated) or parity (69% of non-autistic and 75% of autistic participants were multiparous). Respondents were predominantly UK-based (60% of non-autistic and 50% of autistic participants). Respondents provided a qualitative response describing what influenced their decision about whether to disclose their prenatal depression to a professional. Responses were analysed using content analysis. The first two authors independently devised themes and subthemes arising from the responses, meeting regularly to reach consensus. Counts for each theme per group were calculated.

Results: For both groups, four themes comprising ten subthemes emerged: Awareness; Decision to disclose influenced by support needs; Experience of healthcare; Stigma and vulnerability (Figure 1; Table 1). Disclosure was sometimes influenced by respondents’ level of awareness of their symptoms, with some believing that what they were experiencing was typical for pregnancy and therefore not requiring professional attention. Some respondents were motivated to disclose to obtain support and help minimise the impact of depression on themselves and their family, especially when symptoms were severe. Others, however, felt they were able to cope without support. Another influential factor, particularly among the autistic group, was respondents’ experiences with professionals, with some respondents lacking trust in professionals. Some respondents who disclosed felt their disclosure was dismissed and did not lead to adequate support. Respondents sometimes reported reluctance to disclose due to fear of judgement, with some, particularly autistic respondents, fearing that their child may be taken away if they disclosed.

Conclusions: This study indicates several barriers to disclosing prenatal depression. It is crucial that pregnant people feel able to disclose, in order to get the support that they need. Building trust between professionals and pregnant patients, as well as promoting awareness of the signs of symptoms of prenatal depression, may help both autistic and non-autistic people feel able to seek support.

ORAL SESSION — ADULT OUTCOME: MEDICAL, COGNITIVE, BEHAVIORAL

302 - Aging in Autism

Moderator: Patricia Howlin, King's College London, London, United Kingdom

302.001 (Oral) Age-Related Physical Health of Older Autistic Adults: A Population-Based Cohort Study
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Background:
Growing evidence suggests that physical health problems are common in autistic individuals. However, there remains a concerning lack of research among older autistic adults, and little is known about whether intellectual disability (ID) and sex affect their health outcomes.

Objectives:
The objective of this study was to investigate the associations between autism and co-occurring health conditions in older adults and to examine whether ID and sex play roles in these associations.

Methods:
We conducted a cohort study, based on the Swedish population, of individuals born 1932-1967. We excluded individuals who died or emigrated before age 45. We followed all included individuals from age 45 up to Dec 31, 2013 (the end of available follow-up). Diagnoses
of autism (exposure, lifetime presence or absence) and age-related physical conditions and injuries (outcomes) were obtained from the National Patient Register. We prospectively examined 39 physical conditions commonly associated with age, such as cardiovascular and metabolic disorders, chronic obstructive pulmonary disease (COPD), and musculoskeletal disorders. We also examined different types of injury, such as poisoning and falls, which are other critical aspects of physical health in older adults. For each outcome, we evaluated the 25-year cumulative incidence and used Cox models to estimate the relative risks of physical conditions. All analyses were repeated separately by ID and sex.

Results:

Older autistic adults had higher 25-year cumulative incidence and relative risks of a range of physical conditions and injuries. Bodily injury was most common, with a 25-year cumulative incidence of 50-0% (95% CI 47.6-52.4), followed by falls (39.3% [36.7-41.9]), dorsopathies (12.8% [11.2-14.4]), type 2 diabetes (12.3% [10.4-14.1]), artherosclerosis (11.9% [10.2-13.6]) and diseases of oesophagus, stomach and duodenum (10.5% [8.8-12.1]). Conditions with notable elevated risk include heart failure (Hazard Ratio [95% CI]; 1.62 [2.22]), chronic obstructive pulmonary disease (1.90 [1.62-2.23]), osteoarthritis (1.73 [1.27-2.36]), glycose dysregulation (2.98 [2.06-4.32]), iron-deficiency anaemia (3.17 [2.69-3.73]), and self-harm (7.20 [6.34-8.17]). These elevated risks remained regardless of ID or sex.

Conclusions:

Our results reveal that older autistic adults are at substantial risk for age-related physical conditions and injuries. These conditions were also common in autistic individuals with and without ID and of both sexes. These findings highlight that as autistic individuals age, targeted follow-ups and intervention programs are critically needed to ensure they receive timely help.

302.002 (Oral) Functional Neurological Disorders Among Autistic Adults and Their Associations with Demographic Characteristics and Well-Being


Background:

Functional Neurological Disorder (FND) encapsulates a group of neurological conditions (e.g., chronic pain) that create significant impairments to daily functioning while lacking a definitive cause. The pathophysiological mechanisms of FNDs remain largely unknown. Prior studies suggest phenotypic overlap between FND and autism spectrum disorder (ASD), such as atypical sensitivity to sensory stimuli. Despite this symptomatic overlap between the conditions, very few studies have examined the potential relationship between FND and ASD and how the possible co-occurrence of FND and ASD could vary by demographic characteristics and impact well-being.

Objectives:

To examine the co-occurrence of FND and ASD and its relations to demographic characteristics and well-being.

Methods:

Autistic adults (N=533, 307 assigned female at birth; age range: 18-83, mean=43.28) were recruited through Simons Powering Autism Research (SPARK) Research Match to complete a battery of questionnaires. For the current study, measures of interest were demographic information, health history, questionnaires assessing subjective quality of life (WHOQOL-BREF), perceived stress (PSS), and depression (PHQ-9) and anxiety (GAD-7) symptomatology. Two subgroupings of FND were examined: medically unexplained disorders (MU; n=32; e.g., chronic pain) and physical health conditions with elevated psychological aspects (EP; n=23; e.g., migraines). Each of these two FND subgroupings was compared separately to a control group (n=478) of autistic adults with peripheral physical health conditions (e.g., hyperlipidemia). Chi-square analyses, independent samples t-tests, and Analysis of Covariance (ANCOVA) were used to examine group differences in demographics, quality of life, and mental health.

Results:

The FND subgroupings (MU, EP) contained a greater proportion of females and gender diverse individuals than found in the control group (χ2>11.16, p<.007). Additionally, the MU group was on average younger than the control group (t=3.92, p<.001, d=0.61). Even after accounting for autistic traits (AQ-28 score), age, and birth-sex, both of the FND groups reported lower subjective physical health quality of life than the control group (F=10.47, p<.001, ηp2=.02). Additionally, the MU group reported lower subjective psychological health quality of life (F=5.30, p=.02, ηp2=.01) and higher depression symptoms (F=3.75, p=.05, ηp2=.01) than the control group, after controlling for autistic traits, age, and birth-sex. No FND-control group differences in anxiety symptomatology or perceived stress were found.
Conclusions:

FNDs co-occur in a significant minority of autistic adults, with over 10% of the autistic adults in the current sample reporting an FND, a higher rate than found in the general population. FNDs were more common among autistic adults assigned female at birth, which parallels findings from specific forms of FND in the general population. Additionally, FNDs were more common among autistic adults who identify as a gender minority compared to those who are cisgender. Finally, both FND subgroupings were linked to decreased subjective physical health quality of life, and MU was further associated with lower subjective psychological health quality of life. More work is needed to understand the driving forces behind associations between FND and ASD as well as the impact of this co-occurrence on well-being.

302.003 (Oral) Heterogeneity in Autism: Two Replicated, Longitudinally Stable, Externally Valid Subgroups of Autistic Adults

T. A. Radhoe, J. Agelink van Rentergem, C. Torenvliet, A. P. Groenman, W. J. van der Putten and H. M. Geurts

Background: Autism is heterogeneous, which complicates the search for support for autistic people. Recently, we tested whether we can identify subgroups that could be helpful in determining which type of support people might need. Using mainly malleable factors as input we identified two subgroups of autistic adults that differed on external (clinical) validators such as quality of life, psychological difficulties and cognitive failures (preprint: https://psyarxiv.com/hs4bx/). Based on input of older/autistic adults, we named these subgroups: (1) Feelings of High Grip, and (2) Feelings of Low Grip.

Objectives: The goal of the current study is to test whether these previously identified subgroups are (a) stable over time, (b) different on external (clinical) outcomes, and (c) predictive of future outcomes.

Methods: Self-report questionnaire data were collected as part of a larger multistage overlapping cohort study on aging in autism (Geurts et al., 2021). The data for this study (T2) were collected two to five years after T1. We used community detection analyses for subgroup identification, using 14 variables as input: measures of autism, demographic and psychological characteristics. As preregistered (AsPredicted no. 77679), we first see whether we replicate T1 subgroups with an independent exploratory analysis in the T2-data set of N=452 adults (30-90 years, 241 autistic, 211 non-autistic comparisons), and we identify subgroups separately in autistic adults (N=241).

We test the external validity of the subgroups at T2 for quality of life, psychological difficulties and cognitive failures. Lastly, we test the predictive validity by using subgroup membership at T1 as a predictor of three validators measured at T2: quality of life, psychological difficulties and cognitive failures.

Results: Two subgroups were identified when combining data from autistic and non-autistic adults: Subgroup 1 included mainly autistic adults (96%) and Subgroup 2 included mainly non-autistic adults (89%). Within the autism group, we also replicated our previous findings by identifying two major subgroups: Feelings of High Grip (N=109) and Feelings of Low Grip (N=122). We also replicated our external validity findings of T1: the Feelings of Low Grip subgroup reported a lower quality of life, more psychological difficulties and more cognitive failures as compared to the Feelings of High Grip subgroup.

Conclusions: Based on these preliminary findings we conclude that the subgroups that we previously identified are replicable and valid. Furthermore, this characterization provides information on other domains beyond those used to construct them. Before the INSAR 2023 meeting we will assess subgroup membership stability and predictive validity. These final analysis steps can provide supporting evidence for the validity and importance of the autism subgroups, and may inform autistic adults and their loved ones of their future.

302.004 (Oral) Being Connected - the Influence of Social Connectedness on Quality of Life and Mental Health in Midlife and Older Age

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Background: Research examining the experiences of autistic children, young people, and adults has often indicated lower quality of life, more mental health problems, and low social connectedness (i.e., social isolation) and loneliness, when compared to non-autistic populations. However, despite older age being a period of health and support need changes, few studies have explored the rates and links between quality of life, mental health, and social connectedness later in midlife and older age.

Objectives: This study examined quantitative differences and associations between quality of life, mental health problems, and the experience of social isolation and loneliness among middle-aged and older autistic adults with an age and sex-matched non-autistic comparison group. This study also explored qualitative responses about participants’ experiences of the factors that influence their quality of life in midlife and older age.

Methods: Using a cross-sectional online survey from the AgeWellAutism study, a total of 428 adults (autistic n = 265) aged 40-93 (mean age = 60.50 years) completed standardised questionnaires related to quality of life, current symptoms of depression and anxiety, and their
experiences of social connectedness and loneliness. Participants also responded to open-ended questions about factors that have influenced their quality of life in midlife and older age. Group differences and associations in quantitative measures were examined. Thematic analysis was conducted on qualitative responses to identify common influences.

**Results:** Those in the autistic group reported having lower quality of life, more mental health problems, and being less socially connected (i.e., more socially isolated) and lonelier than the non-autistic group. While there were no gender differences in quality of life, mental health problems, and the experience of social isolation, women reported being lonelier than men in both the autistic and non-autistic group. A similar pattern of results was found when controlling for age and current symptoms of depression and anxiety. Higher social connectedness, lower feelings of loneliness, and fewer symptoms of mental health problems were associated with better quality of life in both groups. Better social connectedness was a particularly strong predictor for higher quality of life and lower mental health problems in the autistic group. Themes identified in the thematic analysis contextualize these experiences and associations, for example, the importance of having support from friends and family.

**Conclusions:** The findings from the current study suggest that autistic adults may be particularly susceptible to lower quality of life, more mental health problems, and higher rates of social isolation and loneliness in older age. Social connectedness was found to be a particularly important predictor of quality of life and mental health for autistic people. This study highlights the importance of social support in midlife and older age and suggests possible targets for interventions to improve autistic people’s quality of life as they enter older age.

**POSTER SESSION — ADULT OUTCOME: MEDICAL, COGNITIVE, BEHAVIORAL**

**401 - Adult Outcome: Medical, Cognitive, Behavioral I**

**401.001 (Poster) “I Am What I Am:” the Role of Essentialist Beliefs and Neurodivergent Identification on Individuals’ Self-Efficacy.**

*A. V. Lebrón-Cruz* and *A. Orvell*, (1)Yale Child Study Center, New Haven, CT, (2)Psychology, Bryn Mawr College, Bryn Mawr, PA

**Background:**

Essentialism is the belief that members of particular categories (e.g., race, gender) are united by an innate and immutable essence. While such beliefs have been associated with negative outcomes such as stereotyping, discrimination, and prejudice, minority group members can at times use essentialist beliefs to validate their identities and empower themselves.

**Objectives:**

Neurodivergence, a term which describes a range of neurological differences, is a relatively recent social category, and it is unknown to what extent it is essentialized. The purpose of this investigation is to examine whether holding essentialist beliefs about neurodivergence serves a protective function among 319 neurodivergent-identifying individuals. Within the context of this work, those who identify as neurodivergent include people who (a) have mental and/or neurological diagnoses (e.g., Autism), (b) might use the label to highlight the naturalness of their condition, and (c) celebrate and/or express how having a different brain may lead to unique life experiences.

We predict that the relationship between essentialist beliefs and self-efficacy will be stronger for those who identify more strongly with the neurodivergent label.

**Methods:**

We recruited a total of 602 individuals from Facebook and Reddit groups centered around neurodiversity (e.g., r/neurodiversity subreddit), disabilities (e.g., The Invisible Disability Support Group on Facebook), and specific disorders (e.g., r/Dyslexia subreddit). After applying exclusion criteria, we retained a sample of 319 participants.

If participants indicated that they identified as neurodivergent and provided consent, they began the questionnaires. Participants completed the neurodivergent identification measure, essentialism measure, self-efficacy measures (counterbalanced), and stigmatization measure. They were then asked to complete open-ended questions pertaining to their lived experiences, and demographic information.

**Results:**

To investigate whether participants’ degree of essentialist beliefs and neurodivergent identification predicted levels of self-efficacy, we performed a regression analysis using PROCESS Model Macro Model 1 to test for moderation (Hayes, 2013). Essentialist beliefs, neurodivergent identification and their interaction were entered as predictor variables and were mean centered. Stigmatization was entered as a covariate. Additionally, there were two separate measures of Self-efficacy utilized—one focusing on global perceptions of success (Model 1: Chen et al., 2001) and the other focusing on perceptions of coping and problem-solving (Model 2: Schwarzer et al., 1995).
Supporting our main predictions, we found that essentialist beliefs were related to higher self-efficacy; further, this relationship was moderated by individuals’ level of neurodivergent identification, such that people with stronger neurodivergent identification showed a stronger relationship between essentialist beliefs and self-efficacy, across both measures (see Figures 1 and 2).

Conclusions:

These results illuminate how essentialist beliefs may validate and empower a group that is often negatively stereotyped. Additionally, as demonstrated by other literature focusing on essentialist beliefs and treatment outcomes, the results of our study may also have implications for that of Autistic individuals’ treatment. Developing interventions which focus on embracing neurodivergent identity and validating one’s life experiences may be a powerful approach to improving Autistic individuals’ quality of life.

401.002 (Poster) "We Have Excessive Dysphoria, Not Only Gender Dysphoria": A Qualitative Analysis of the Co-Occurrence of Autism/Neurodiversity and Gender Dysphoria in Japan

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Background:

Recently, there has been increased attention on a link between Autism/Neurodiversity (A/ND) and Gender Dysphoria (GD). Since the late 1990s, clinical attention has been paid to the co-occurrence of A/ND and GD. De Vries et al. (2010) first reported the prevalence of A/ND in GD individuals was 7.8%, which was 7 to 8 times higher than 1% of the world population (e.g., Lai et al., 2014). After the report, it has been discussed actively whether there is a link between A/ND and GD or not (see Kallitsounaki and Williams, 2022, for a review), and underlying hypotheses for the link (see Van der Miesen et al., for a review). To examine the underlying hypothesis for the A/ND-GD link, exploring these individuals’ experiences is essential, but previous research has little focus on the views of those with A/ND and GD except a few qualitative studies in Europe and North America (e.g., Strang et al., 2018).

Objectives:

This study explores the experiences of Japanese adults with A/ND experiencing GD to examine the underlying hypothesis for the co-occurrence.

Methods:

Sampling:

17 Japanese adults with A/ND experiencing GD were recruited from developmental clinics (n=8), gender clinics (n=7), and a self-help group (n=2).

Sample Characteristics:

- All participants are clinically diagnosed with Autism Spectrum Disorder.
- For GD, participants who were aware of GD were recruited. We did not ask them if they have been diagnosed with GD according to the criteria of DSM-5, in consideration of gender diversity.
- 4 Participants were assigned females and 13 were assigned males at birth.
- Ages ranged from 20 to 49 (Mean=30.8, SD= 9.5)

Data collection:

We asked the participants about their life stories regarding the co-occurrence of A/ND and GD from their early childhood to today in semi-structured interviews. The duration time of each interview was approximately 90 to 120 minutes, and each participant had two or three interviews.

Analysis:

Interview data were analyzed using Grounded Theory (Charmaz, 2020).

Results:
The key finding is that the participants have had not only GD but also other types of excessive dysphoria. For example, they had physical dysphoria due to GD but also due to hypersensitivity. Also, since their childhood, they have been feeling dysphoria again and again by being forced to conform to allistic norms including gender norms. And most participants reported that they have been feeling dysphoria that they cannot explain well. This result indicates the need to explore the underlying hypothesis of the co-occurrence, by considering not only GD, but also cumulative dysphoria from childhood. In other words, GD itself might not have a direct link to A/ND, but the excessive of dysphoria might have a link to A/ND.

Conclusions:

This study provides a new perspective on A/ND-GD co-occurrence that GD itself might not have a direct link to A/ND. Instead, we argue that the underlying hypothesis of the co-occurrence is that autistic people are forced to experience excessive dysphoria, including GD, in their social lives from childhood.

401.003 (Poster) "the World's Really Not Set up for the Neurodivergent Person": Understanding Emotion Dysregulation and Mental Health Needs from the Perspective of Autistic Adults

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Background: Emotion dysregulation, difficulty monitoring and modifying emotional reactivity and sustained negative emotion, underlies many co-occurring mental health conditions and suicidality in autism. Autistic individuals are 7 times more likely to have impairing emotion dysregulation than neurotypical peers. Most emotion dysregulation research has focused on youth, and little is known about unique aspects of emotion dysregulation in adulthood.

Objectives: The current study sought to understand autistic adults’ experiences of emotion dysregulation and perceived service needs as a precursor to refining existing evidence-based emotion dysregulation interventions for autistic adults.

Methods: Fifteen autistic adults aged 19-68 (7 men, 7 women, 1 transgender, 33% non-Hispanic Black, 7% Hispanic White, 60% non-Hispanic White, median age of diagnosis = 21) completed a 60-minute semi-structured interview. Participants were asked to share stories of recent instances of emotion dysregulation and provide emotion dysregulation service recommendations. Interviews were transcribed and a grounded theory analytic approach was used for coding and thematic analyses. Three coders, including one autistic adult, generated the initial codebook using a consensus approach. The finalized set of codes was grouped into themes and subthemes. Authors discussed and refined themes until consensus was reached. Autistic adults were involved in all aspects of this project.

Results: Thematic analyses illuminated that episodes of emotion dysregulation were often described in the context of a pervasive lack of control at all levels of social life (individual, interpersonal, systemic). At the individual level, participants described limited emergent awareness and control over emotion dysregulation, which was often a product of and sometimes indistinguishable from sensory overload. Episodes of emotion dysregulation resulted in suicide attempts, self-injury, or aggression in over one third of the sample. At the interpersonal level, every participant described interactions in which they were emotionally dysregulated as a result of being misunderstood by a neurotypical person (e.g., family, friend, colleagues). Many described the injustice that occurred when neurotypical people responded to their dysregulation by threatening serious consequences (e.g., disciplinary action, loss of friendship). At the systemic level, participants most frequently referenced a lack of power in healthcare settings (e.g., psychiatric/medical hospitals, crisis centers, outpatient offices) and workplaces. Participants described unjust responses (e.g., involuntary sedation, removal from services, suspension of dental care, loss of job), and feeling unsafe. Across all levels, most of the sample (80%) described holding a tension between the personal costs of camouflaging and the serious consequences of not camouflaging in order to survive adult life. Autistic adults detailed recommendations for better emotion regulation support, including accommodations and access to safe places and people, connection with other autistic people, fostering self-acceptance, and broader societal education and acceptance of neurodivergence.

Conclusions: This study is the first to unpack autistic adults’ own perception of emotion dysregulation which is described as due to a lack of control at all levels of social life. Future directions will require a holistic systems approach, eliminating injustice in healthcare and employment settings, promoting wider acceptance of neurodivergence in neurotypical society, and supporting autistic adults in cultivating self-acceptance, self-advocacy, and regulation skills.

401.004 (Poster) A "Triple Empathy Problem" May Lead to Adverse Healthcare Outcomes for Autistic Adults: A Qualitative Analysis

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Background: Autistic people experience poor physical and mental health compared with non-autistic people, and life expectancy is reduced. Autistic people are more likely to use emergency healthcare and to experience emergency hospital admission, after which inpatient mortality is increased.

Barriers to healthcare are well documented. We have previously shown that these barriers are significantly associated with self-reported adverse health outcomes for both formally diagnosed and self-identified autistic respondents. We reported 80% of autistic respondents experienced difficulty attending primary care, with two thirds describing untreated physical and mental health conditions and one third unable to access treatment for potentially serious or life-threatening conditions. Barriers such as telephone-based appointment booking, difficulty communicating with reception staff and doctors, along with sensory challenges in the waiting room are significantly associated with adverse outcomes.

Objectives: This paper presents the qualitative phase of the study. We aimed to explore in depth the experiences of autistic adults accessing healthcare on an experiential level and to identify target areas for intervention to improve access and outcomes.

Methods: This is a quasi-phenomenological study from an autistic research team including autistic medical doctors, using participatory methods. Data were collected as part of a large, mixed-methods, international survey which began with a community-identified need to develop autism training for healthcare providers. A 52-item self-report survey was distributed online. The quantitative results are previously published and this paper reports the qualitative findings, following a thematic analysis.

Results: Data from 1248 autistic respondents were included. Respondents reported a variety of healthcare barriers and adverse outcomes. Here, we give voice to their stories, in their own words. Themes included: early barriers; communication mismatch; doubt – in oneself and from doctors; helplessness and fear; healthcare avoidance and adverse health outcomes; with overarching themes of epistemic injustice and what we term a “triple empathy problem”.

“"The hardest thing about going to the doctor is making the big step of making yourself vulnerable in order to ask for help but often finding help does not come”

Conclusions: Autistic people face barriers accessing healthcare, followed by difficulties interacting with healthcare providers, which may contribute to known healthcare disparities, including increased morbidity and mortality.

Using our exploratory findings, we produce a model that seeks to understand and explain the reported barriers in the context of the previously known healthcare inequities by exploring the interactions between access barriers and adverse outcomes. We also draw on, and build upon, Damian Milton’s “double empathy problem”, situating this in a medical context, to describe what we term a “triple empathy problem”. The double empathy problem describes the bi-directional difficulty autistic and non-autistic people can have understanding each other. There is a similar phenomenon at play between medical practitioners and lay people, which is further compounded for autistic people, leading to additional healthcare access barriers. This is supported by our finding that autistic respondents with medical backgrounds did not report better experiences with healthcare access. Improved healthcare outcomes for autistic people can be achieved by healthcare providers understanding the autistic experience.

401.005 (Poster) A Metaphorical Analysis of Autistic Meltdowns & Shutdowns

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Background:

“Meltdowns” and “shutdowns” are common responses to dysregulation among autistic people in the face of social, sensory, or other stressors. While previous literature has described behaviors of autistic children during meltdowns, little is known about how meltdowns and shutdowns are experienced by autistic people themselves. Preliminary qualitative data suggests that these experiences are deeply internalized beyond the externalized reactions visible to outside observers. Figurative language used by autistic people can offer rich insight into what this experience feels like for those living it.

Objectives:
The purpose of this qualitative secondary data analysis was to identify the metaphors autistic individuals used to describe experiences of dysregulation, including meltdowns and shutdowns.

Methods:

This study was conducted by a team of autistic and non-autistic people using a participatory action approach. We used the Pragglejaz Group’s metaphor identification procedure to identify figurative language used to describe meltdowns and shutdowns by autistic individuals. Data were collected in two previous phenomenological studies exploring the lived experiences of meltdowns (n = 32) and shutdowns (n = 26) for autistic adults, collected via online interviews, as well as a mixed methods survey study exploring autistic feedback on a tool to facilitate communication about meltdowns and shutdowns for providers and patients (n = 46). Participants ranged in age from 18 to 69 years (M = 35.3); 55% female-identifying, 24.4% male-identifying, and 20.6% gender divergent; 66.1% formally diagnosed as autistic; 15.5% not formally evaluated but told by a health professional they are likely autistic; 18.4% self-identified; 87% White; seven countries represented, primarily United States (66.1%), Australia (10.5%), United Kingdom (10.5%), and Canada (9.2%). Our corpus of text consisted of 79 typed pages, of which we judged 696 lexical units to be used metaphorically. We sorted these into metaphors used most often by autistic adults to describe their meltdown and shutdown experiences.

Results:

Eight metaphors emerged that participants used most frequently to describe the experience of meltdowns: a bomb exploding; something cracked; trying to escape; slamming my lid; a spammy pop-up; hitting my limit; going off-script; and animalistic survival. Six metaphors characterized the experience of shutdowns: being frozen; the blue screen of death; going inside myself like a snail; not keeping up with the world; running on autopilot; and feeling stuck.

Conclusions:

These metaphors add a new voice for understanding autistic people’s experiences of meltdowns. Findings can offer new ways to relate to an experience that can be difficult to describe, thus bridging the double empathy problem. In addition, though autistic people are often thought to use and understand language literally compared to non-autistic people, our findings add to evidence about how autistic people use figurative speech in naturally occurring written expressive language to describe their experiences. Finally, findings suggest that meltdowns and shutdowns each include internalized components, and distinguishing between types of dysregulation may be irrelevant to understanding the experience.

401.006 (Poster) A Randomized Controlled Trial of PEERS® for Careers: Building the Evidence Base and Breaking Employment Barriers for Autistic Adults

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Background: Autistic adults are more likely to be unemployed or underemployed than their peers, both with and without disabilities (Shattuck et al., 2012; Chen et al., 2012). Beyond employer stigma and lack of knowledge about autism (Scott et al., 2019), autistic adults express multifaceted barriers to finding and keeping employment, including challenges related to professional social communication (Black et al., 2020; Anderson et al., 2021). PEERS® for Careers is a novel employment-focused social skills intervention developed to address this need (Moody et al., 2022). Informed by focus groups with autistic adults and other stakeholders, and using evidence-based methods of social skills instruction (Moody & Laugeson, 2020) including career coaching, the curriculum teaches skills needed to obtain, maintain, and thrive in employment settings (e.g., resume writing, interviewing, conversational skills, workplace culture).

Objectives: The purpose of this study was to conduct the first randomized controlled trial of PEERS® for Careers to test the efficacy of the curriculum and determine the level of support most beneficial for autistic adults.

Methods: Participants included 106 autistic adults (M age=22.9, SD=3.6; M IQ=109.6, SD=12.9; 81% male; 49.1% White) who expressed interest in learning employment-related social skills and seeking employment opportunities. All participants received the 20-week PEERS® for Careers curriculum, with 53 participants randomly assigned to additionally receive a career coach to support practice and application of the PEERS® for Careers skills outside of lessons. No significant differences on demographic or outcome variables emerged between the Coach and No-Coach conditions at baseline. Adults completed questionnaires pre- and post-intervention assessing employment status, employment-related social skills knowledge (Test of Employment Social Skills [TESS]; Moody et al., 2022), and social responsiveness (Social Responsiveness Scale, 2nd Edition Self-Report [SRS-2]; Constantino & Gruber, 2008).
Results: Results revealed significant improvements following PEERS® for Careers in employment-related social skills knowledge (TESS), $p<.001$, feelings of preparedness for employment, $p<.001$, and social responsiveness (SRS-2), $p=.004$. Nonparametric tests also showed a significant increase in engagement in employment-related activities, $p<.001$, as well as in paid employment, $p<.001$, from pre- to post-intervention. Those randomized to receive a career coach were more likely to remain enrolled, $p=.034$, and after the 20-week curriculum, showed significantly greater improvements on both the TESS, $p=.007$, and subjective ratings of preparedness for employment, $p=.033$, than those without a coach. Importantly, among participants who were not engaged in any employment-related activity at baseline ($n=62$), those who received career coaching were significantly more likely than the No-Coach group to gain new employment, internship, or volunteer positions by post-intervention, $p=.025$. Future planned analyses will examine continued benefits of PEERS® for Careers during a 10-week employment/internship phase, which included a re-randomization, and subsequent 10-week follow-up phase.

Conclusions: Overall, findings suggest that PEERS® for Careers is effective in improving employment-related outcomes for autistic adults. Results further indicate that career coaching reduces attrition and produces greater benefit than the curriculum alone. In sum, PEERS® for Careers shows success in supporting autistic job-seekers in achieving their employment goals. To build upon this, we intend to develop employer supports to foster more inclusive workplaces.

401.007 (Poster) Age and College Enrollment As Predictors of Treatment Outcomes Among Autistic Young Adults: The UCLA PEERS® Intervention

Background: Challenges with social communication and interaction are a defining characteristic of autism spectrum disorder (ASD; Lord et al., 2020). Given the importance of social connectedness in the transition into adulthood (Monohan et al., 2021) and the vast heterogeneity within autistic individuals (Masi et al., 2017), there is a need for evidence-based social skills interventions among this population. One of the only such programs for autistic young adults is the UCLA Program for the Education and Enrichment of Relational Skills (PEERS®; Laugeson, 2017). However, there are individual and contextual factors yet to be explored that might influence treatment response; specifically, age and enrollment in postsecondary education may impact access to same-age peers and, relatedly, opportunities for skills practice and application during the intervention.

Objectives: This study examined the influence of age and college enrollment on treatment gains of autistic young adults following PEERS® for Young Adults.

Methods: Participants included 102 young adults (males=74, females=28; $M_{age}=23.03$, $SD=3.94$) and their caregivers who completed the PEERS® program. Participants presented with an historical autism diagnosis or clinically-elevated autism symptoms (i.e., total T-score $\geq 60$ on the Social Responsiveness Scale–Second Edition; SRS-2; Constantino & Gruber, 2012). Participants were classified as “In-College” ($n=56$) or “Not-in-College” ($n=46$) based on baseline demographic questionnaire responses. Treatment outcome was assessed using change scores on the SRS-2, Social Skills Improvement System (SSIS; Gresham & Elliott, 2008), Quality of Socialization Questionnaire (QSQ; Frankel et al., 2010), and Test of Young Adult Social Skills Knowledge (TYASSK; Laugeson et al., 2015).

Results: As a whole, the sample significantly improved on all outcome measures ($p$’s$<.001$). At baseline, the Not-in-College participants were on average older, $p=.001$, and had poorer social responsiveness, $p=.006$, than In-College participants. Through a series of ANCOVAs including our variables of interest, college status and age, and a covariate of baseline social responsiveness, neither age nor college enrollment significantly predicted change in social skills (SSIS), problem behaviors (SSIS), or social skills knowledge (TYASSK). The Not-in-College group exhibited marginally greater pre- to post-intervention improvements on the SRS-2 ($M_{diff}=-8.48$) than the In-College group ($M_{diff}=-5.29$), $F(1,88)=3.70$, $p=.058$, over and above age and baseline social responsiveness, such that between-group differences in social responsiveness became non-significant at post-intervention, $p=.664$. Further, there was a trending, positive association between age and change on the QSQ, such that older participants tended to show greater increases in get-togethers post-treatment, $B=.216$, $F(1,86)=3.06$, $p=.084$, over and above college status and baseline social responsiveness.

Conclusions: Regardless of age and college enrollment status, results reveal that autistic adults exhibit significant improvements in social functioning following the PEERS® for Young Adults intervention. Marginally greater improvements in adults of older age or not currently enrolled in college on treatment outcomes suggest that those without pre-existing, structured access to peers (i.e. academic courses, clubs/extracurriculars) may especially benefit from instruction on how to find, engage, and deepen connections with sources of friends through the PEERS® curriculum. Future studies might explore additional factors influencing treatment presentation and outcomes among autistic adults to create more effective, targeted interventions for this population.
401.008 (Poster) An International Priority Setting Partnership (PSP) to Identify and Prioritise Evidence Gaps at the Intersection of Autism and Addiction Using an Adapted Delphi Methodology

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Background: Autism Spectrum Disorder (hereafter autism) is a neurodevelopmental condition affecting 1–2% of people worldwide. It commonly presents with co-occurring physical and mental health conditions, and morbidity and mortality rates are higher than those in the general population. Research is limited, but some evidence suggests that autistic individuals might be more likely to have addictions compared to the general population. The rate of substance use disorder (SUD) in autistic people is up to 36%, yet little is known of the underlying aetiology or effective ways of managing SUD in autistic individuals. For behavioural addictions (e.g., gambling) there is a lack of evidence about the mechanisms and motivations in autistic people.

Objectives: To identify the evidence gaps in relation to three sub-topics: problematic alcohol use, substance use and behavioural addictions in autism and, secondly, to reach consensus on the top ten priorities for research, policy and practice.

Methods: We convened an international Priority Setting Partnership (PSP) of potential stakeholders including experts by experience. The phased process included a structured scoping review to identify gaps in the literature and an online survey of questions respondents had about problematic alcohol use, substance use, gambling and autism. The core project team reviewed the final results and a panel of 22 members participated in a two-stage Delphi process and rated the questions in terms of priority.

Results: The structured scoping reviews showed limited evidence from studies that were contradictory, could not be replicated, were reliant on specific tasks and limited by sample sizes. Overall findings suggested that more research is needed to understand the aetiology, prevention and treatment of addictions in autism.

A total of 78 stakeholders, including clinicians and academics in the fields of addiction and autism, autistic professionals, and autistic individuals with lived experience of addiction, posed 601 unique questions via an online survey. Additional questions were elicited via workshops. After excluding questions on the basis of being out of scope or duplications of other questions a final list of 340 questions was confirmed. These questions were analysed and classified into themes of topic questions to be agreed by stakeholders and the Delphi panel. Two iterative rounds of the Delphi process reduced 38 questions to 14 for rating.

The Delphi process produced consensus ratings for top ten policy priorities for research (3), policy (3) and clinical practice (4).

Conclusions: Results indicate agreement regarding directions for future collaborative cross-disciplinary approaches to tackling this important but marginalised area of addiction.

401.009 (Poster) An Overlooked Mental Health Condition: First Estimates of Prevalence and Clinical Correlates of Misophonia in Cognitively-Able Autistic Adults

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Background: Misophonia is a newly-described psychiatric disorder in which individuals have strong negative emotional responses (typically extreme irritation, anger, or disgust) in response to specific “trigger” sounds (e.g., chewing, tapping, and sniffing), resulting in significant distress, pathological avoidance behavior, and impairment in daily life (Swedo et al., 2022). There is a sizable body of evidence to suggest that misophonia, like other forms of decreased sound tolerance, is common in the autistic population (Williams et al., 2021). However, the prevalence of this specific phenotype (as opposed to other forms of sound intolerance such as hyperacusis and phonophobia) and its effects on mental health and well-being remain poorly understood.

Objectives: To describe the prevalence, clinical features, and correlates of suspected misophonia (based on a validated screening tool) in a large sample of cognitively-able autistic adults.

Methods: Independent autistic adults aged 18–80 years (n=936, MAge=37.49 years, 63.0% female sex, 80.1% non-Hispanic White, median age of autism diagnosis=23.2 years) were recruited via Simons Powering Autism Research for Knowledge (SPARK) Research Match (Feliciano et al., 2018), as part of a study of sensory differences in autism (RM0111Woynaroski - DST). Misophonia status was determined using the Duke-Vanderbilt Misophonia Screening Questionnaire (DVMSQ; Williams et al., 2022), and both the DVMSQ and Duke Misophonia Questionnaire (DMQ; Rosenthal et al., 2021) were used to characterize the misophonia phenotype.
**Results:** Approximately one third of autistic adults (n=332; 35.5%) screened positive for misophonia on the DVMSQ. Of this misophonia group, 73.8% (n=245; 26.2% of full sample) endorsed “moderate” or “severe/very severe” misophonia-related impairment on the DMQ impairment subscale. The most commonly endorsed trigger sounds included “people talking in the background (e.g., phone calls in public, many people talking at once)” [77.1%], “people making mouth sounds while eating or drinking (e.g., chewing, crunchy slurping)” [70.8%], and “people making repetitive sounds (e.g., typing, tapping nails on table, pen clicking, writing, construction work, using machinery)” [68.7%]. The most frequent emotional reactions when triggered were extreme annoyance/irritation (mean of 3.65 on 0-4 scale), anger/rage (mean of 2.66), disgust (mean of 2.39), and fear/panic (mean of 2.06), and nearly 70% of the misophonia group endorsed physical responses to triggers. Misophonia was more common in females and individuals who additionally reported other forms of decreased sound tolerance. After controlling for sex, age, and hyperacusis status, DVMSQ misophonia status was associated with higher anxiety (d=0.555, CrI: 0.412, 0.698) and depression (d=0.529, CrI: 0.380, 0.684) symptoms, and after controlling for those variables and current anxiety/depression symptomatology, misophonia status was associated with highertrait anxiety (d=0.315, CrI: 0.182, 0.447), more ADHD symptoms (d=0.304, CrI: 0.170, 0.440), more anger-related symptomatology (d=0.298, CrI: 0.184, 0.413), greater somatic symptom burden (d=0.305, CrI: 0.170, 0.442), and reduced overall quality of life (d=−0.131, CrI: -0.262, -0.002).

**Conclusions:** Misophonia was highly prevalent in the present sample of cognitively-able autistic adults, with over 35% screening positive for the condition. Misophonia status is a significant predictor of many relevant mental health outcomes in autistic individuals, highlighting the need for additional research on this understudied disorder and its role in the well-being of autistic adults.

401.010 (Poster) Looking at Me Anxiety: Gaze Anxiety in Autism

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Background: Anxiety is a common co-occurring diagnosis in the autism population. Lack of eye contact is one of the diagnostic criteria of an autism diagnosis. The Gaze Anxiety Rating Scale (GARS; Schneier et al., 2011) has been used in social anxiety research to measure gaze anxiety. In non-autistic research gaze anxiety has a positive relationship with social anxiousness and general anxiety. Previously the Gaze Anxiety Rating Scale has not been used in a large autistic participant group study using diagnosed autistic adults. As there is a large prevalence of social anxiety and general anxiety in the autism population along with potential reduced eye contact behavior, exploring the relationship between social, general and gaze anxiety may aid in understanding anxiety presentations in the autism population.

Objectives: The aim of this study was to determine if the GARS can be used in the autistic adult population to measure gaze anxiety. Further this study investigated the relationship between gaze anxiety and generalised anxiety in an autistic cohort and compared this to a non-autistic cohort.

Methods: An online survey method was used with community-sampled participants diagnosed with autism (n = 133), broadly representative of the Australian autistic population, and a concurrently collected non-autistic control group (n = 129). Gaze anxiety was measured using the GARS, social anxiety was measured by the Liebowitz Social Anxiety Scale-Self Report (LSAS-SR; Liebowitz, 1987), and general anxiety was measured using the DASS-21 (Lovibond & Lovibond, 1995).

Results: The GARS was found to be a reliable measure in an Australian community-based adult autistic cohort. In the autistic cohort, higher levels of anxiety and stress measured by the DASS-21, social anxiety as measured by the LSAS-SR, and gaze anxiety as measured by the GARS, were found when compared to a same time data collected non-autistic cohort. A positive relationship was found between the GARS and, general anxiety and social anxiety measures.

Conclusions: The GARS was found to be a reliable measure of gaze anxiety in the autistic cohort. Measuring gaze anxiety may aid in understanding anxiety presentations in autistic adults. The autistic cohort reported significantly higher levels of social, general and gaze anxiety than the non-autistic control.

401.011 (Poster) Are Parkinsonism Features Stable and Linked to Other Aging-Related Concerns Among Middle Aged and Older Autistic Adults?


Background: Emerging evidence linksparkinsonism (i.e., motoric features associated with Parkinson’s Disease, such as limb stiffness and bradykinesia) with autism during middle and older adulthood. However, research to date has been limited to cross-sectional studies only; no studies have examined whetherparkinsonism features change over time. Additionally, it is unclear if there are links between theseparkinsonism features and other aging-related concerns, such as cognitive decline and falls, among middle and older age autistic adults.

Objectives: Examine change inparkinsonism features over a two-year period and contemporaneously investigate associations between parkinsonism features and both subjective reports of cognitive decline and falls during middle and older adulthood in autism.
Methods: 210 autistic adults (58% female) ranging in age from 43-81 (M=56) years were recruited via Simons Powering Autism Research (SPARK) Research Match and completed a series of online questionnaires two years after their original study participation. The presence of parkinsonism features was evaluated using the Parkinsonism Screening Questionnaire (PSQ) at both Time 1 and Time 2. Subjective cognitive decline was measured using the Eight-item Interview to Differentiate Aging and Dementia (AD8) at Time 2. The presence and number of falls a participant had experienced in the last year were also queried at Time 2. Repeated measures analysis of covariance and a partial correlation, both accounting for the effect of lifetime antipsychotic medication exposure, were used to examine change in parkinsonism features over time and associations between parkinsonism features and subjective reports of cognitive decline at Time 2, respectively. Additionally, independent samples t-tests were used to evaluate whether autistic adults reporting falls also reported greater parkinsonism features at Time 2.

Results: Parkinsonism features demonstrated a small but significant improvement (Time 1: M=3.63, SD=4.02; Time 2 M=2.64, SD=3.53) over the course of two years in this sample of middle and older age autistic adults, even after accounting for antipsychotic exposure ($F=6.04, p=.015$). However, screen positive rates for parkinsonism using the PSQ remained high (28.6%). Partial correlations revealed that increasing parkinsonism features were significantly associated with increased reports of subjective cognitive decline ($r=.32, p<.001$; see Figure 1) even after accounting for antipsychotics exposure. Finally, autistic adults who reported experiencing falls (n=44) rated themselves as having significantly more parkinsonism features than those who did not experience falls ($t=2.00, p=.047$).

Conclusions: On the group level, parkinsonism features modestly decreased over time among middle and older age autistic adults. Despite the decrease in symptoms, screen positive rates for parkinsonism remained high at Time 2 (~29%) and were only slightly lower than screen positive rates documented in an overlapping sample that was nearly twice as large at Time 1 (~33%). Furthermore, increasing parkinsonism features were associated with greater subjective reports of cognitive decline and with a recent history of falls among this group of autistic adults. These findings represent a first step to better understanding the developmental progression of the increased risk for parkinsonism among autistic adults and its links to aging-related concerns.

401.012 (Poster) Arithmetic Performance in Visual and Auditory Modalities in Adults with High-Functioning Autism

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Background: Individuals with high-functioning autism typically show average mathematical skills despite limitations in verbal communication. Previous brain imaging research indicates that language ability plays an important role in performing exact mental computation. Little is known about the neural mechanisms for numeric processing in individuals with autism. For instance, it is unclear whether using visually presented Arabic numbers would bypass the language-related neural networks and eliminate the language-specific effects in arithmetic performance.

Objectives: The present event-related potential (ERP) study aimed to compare adults with high-functioning autism and age-matched control subjects with a mental addition task in visual and auditory modalities.

Methods: Sixteen monolingual adults with clinical diagnosis of high-functioning autism (or Asperger’s) and sixteen age-matched neurotypical control subjects participated in the study. All subjects were native speakers of English, had normal hearing, and were right-handed. The mental addition task used two-digit numbers. There were two presentation conditions. Each trial in the visual condition started with a tone beep prompt. Then the two Arabic numbers with the “+” sign in between were presented together next, followed by the answer in Arabic number. The auditory condition replaced the question part (not the answer part) with auditory verbal stimuli. There were 120 trials for each condition and each answer. The auditory stimuli were presented at 60 dB sensation level. Inter-stimulus interval was randomized between 1500 ~ 2000 ms. Subjects were required to press button for responses. The EEG data were recorded with a 64-channel EEG system in an acoustically-treated booth. The sampling frequency was 512 Hz, and the bandpass filter was 0.016 - 200 Hz. Trials with peak amplitudes exceeding the range of +/- 50μV were rejected. The data were bandpass filter at 0.5-40 Hz and the epoch window was -100 ~ 1000 ms.

Results: Behavioral data showed no significant differences in response accuracy between the two subject groups and two modalities for mathematical calculation. While the control subjects did not show differences in reaction time between the two modalities, the autism group took significantly longer time in the auditory mode than the visual mode, indicating a verbal working memory influence. Both behavioral and ERP data consistently showed strong effects of congruent and incongruent conditions in the two groups. For all subjects, it took longer reaction time to respond to incongruent condition than congruent condition. Corresponding to the behavioral results, the incongruency effect was reflected by a negative ERP component between 300 and 400 ms followed by a positive component between 400 and 600 ms in the visual mode. Compared with neurotypicals, adults with high-functioning autism showed delayed neural responses for the incongruency effect in both early and late components in the auditory mode. Furthermore, a late negative response was found in the autism group.
Conclusions: The behavioral and ERP results indicate that verbal working memory affects neural processing speed of arithmetic performance in individuals with autism. Further, there appears to be no significant difference from neurotypical peers in their arithmetic performance in the visual mode.

**401.013 (Poster) Measuring Adaptive Behavior in Autistic Adults: Comparison of the Vineland-3 Interview Form and Abas-3 Survey**  
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**Background:** Adaptive behavior is a broad set of behaviors important to maintaining independence and community participation. The Vineland Adaptive Behavior Scales (VABS; Sparrow et al., 1984; 2005; 2016) and Adaptive Behavior Assessment System (ABAS; Harrison & Oakland, 2003; 2008; 2015) are frequently used adaptive behavior measures. While the VABS is designed for use from birth-adulthood, the ABAS has separate forms for children and adults, potentially making it more useful for assessing a wider range of adult-relevant skills. Comparisons of the ABAS and VABS in child and adolescent samples (Dupuis et al., 2021; Lopata et al., 2013, Tamm et al., 2022) suggest caution is warranted, as ABAS scores have been found to be inconsistently higher than VABS. To our knowledge, no studies to date have looked at the correspondence between Vineland-3 and ABAS-3 in a sample of autistic adults.

**Objectives:** The current study aimed to directly compare parent-report VABS-3 and ABAS-3 scores in a dataset of autistic adults; comparisons are made within adults with nonverbal IQs (NVIQ) <70 and 70+.

**Methods:** Participants (N=29) were referrals to a specialty adult autism clinic or research projects aimed at characterizing autism in adulthood. Caregivers completed the VABS-3 interview and ABAS-3 survey form. All VABS-3 and ABAS-3 were administered within 11 months, with 79% within 3 months (M=1.46 SD=2.59, range=0-11). Standard scores are reported for comparison to other studies; however, because the ABAS-3 floor goes down to approximately 50 and VABS-3 domain floors go as far down as 20, all analyses were conducted using adjusted VABS-3 scores (VAdj), in which all VABS scores below 50 were assigned a value of 49. Analyses were conducted in the full sample and separately for those with NVIQ <70 (n=11) and 70+ (n=18).

**Results:** VABS-3 Adaptive Behavior Composite (ABC) were significantly lower than the ABAS-3 General Adaptive Composite (GAC) even when using AdjABC (d=-.82; Table 1). There was not a significant difference in classification (<70 vs. 70+) on instruments (p=.07); 72% were similarly classified with 9 falling below 70 and 12 70+ on both instruments. VAdjABC scores were significantly lower than the ABAS-3 GAC for both adults with NVIQ<70 (d=-1.12) and those with NVIQ 70+ (d=-.71; Figure 1). Similarly, VAdj Daily Living Skills were significantly lower than ABAS-3 Practical scores for both groups (d=-1.11; d=-.92, respectively). For adults with NVIQ<70, VAdjCommunication and VAdjSocialization scores were lower than ABAS-3 Conceptual (d=-1.24) and Social domains (d=-1.45), respectively. In contrast, for adults with NVIQ 70+, comparison across instruments revealed smaller, non-significant differences (d=-.25, d=-.37).

**Conclusions:** In this sample of autistic adults, VABS-3 scores were lower than ABAS-3 scores. For those with cognitive impairment (i.e., NVIQ <70), differences were larger, likely reflecting wider variability in skills assessed by VABS-3 resulting in lower basal values. For those NVIQ 70+, closer examination of difference between the Daily Living and Practical domains is needed. Considering the wider-spread use of the VABS in autism research, findings suggest caution in assuming measures can be used interchangeable and highlight a need for further research to inform interpretation across studies.

**401.014 (Poster) Associations between Self-Reported Internalizing and Externalizing Symptoms and Scores on the Social Responsiveness Scale-Second Edition in Two Autistic Adult Samples.**  
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**Background:**

The Social Responsiveness Scale-Second Edition Adult form (SRS-2:Adult) is a self-report screening questionnaire commonly used to quantify severity of autism symptoms (Constantino & Gruber, 2012). Research suggests that scores from the parent-report version are influenced by non-autism-specific factors, warranting caution when used as a measure of autism severity in children (Caprioa-Hall et al., 2021; Havdahl et al., 2016; Cholemkery et al., 2014; Hus et al., 2013). Few studies have considered these factors in autistic adults. South and colleagues (2017) reported strong correlations between the SRS-2:Adult and self-report measures of anxiety. Considering high rates of co-occurring psychological and behavioral conditions in autistic adults (e.g., depression anxiety; ADHD; e.g., Hollocks et al., 2018; Jadav et al., 2022), research is needed to further understand how symptoms associated with co-occurring conditions affect SRS-2:Adult scores.
Objectives:

To examine the influence of non-autism-specific factors which may affect the interpretation of SRS-2:Adult scores.

Methods:

Study 1. 66 participants with both SRS-2 and ASR scores were drawn from a sample of 72 adults with autism diagnoses referred to a specialty adult autism clinic or adult autism research studies (Table 1). Pearson’s correlation analyses were used to assess the relationship between SRS-2 scores and the Internalizing and Externalizing subscales of the ASEBA Adult Self Report (Achenbach et al., 2017). Chi-square analyses were used to explore the association between clinical cut-offs on each instrument.

Study 2. 50 autistic adults with both SRS-2 and ASR scores were drawn from a sample of 66 adults recruited for an online survey of repetitive behaviors were used to internally replicate findings from Study 1 (Table 1).

Results:

Study 1. SRS-2 T-Scores were positively correlated with Internalizing ($r=0.48, p<.001$) and Externalizing ($r=0.30, p=0.015$) ASR scales. SRS-2:ASR Internalizing correlations were significant for both males ($r=0.54, p=0.002$) and females ($r=0.48, p=0.005$), while Externalizing was associated for females ($r=0.43, p=0.014$) but not males ($r=0.04, p=0.841$). Overall sensitivity of the SRS-2:Adult was 80.6%. SRS-2 classification was marginally associated with ASR-Externalizing classification ($X^2(1)=3.51; p=0.061$), but not the ASR-Internalizing scale ($X^2(1)=3.74; p=0.390$, Table 2).

Study 2. SRS-2 T-Scores were positively correlated with Internalizing ($r=0.63, p<.001$) and Externalizing ($r=0.34, p=0.016$) ASR scales. SRS-2:ASR Internalizing associations were observed for males ($r=0.68, p=0.021$) and females ($r=0.63, p<0.001$), whereas Externalizing were marginal (females: $r=0.31, p=0.052$) or nonsignificant (males: $r=0.42, p=0.201$). Sensitivity of the SRS-2:Adult was 82.4%. SRS-2 classification was associated with ASR-Externalizing ($X^2(1)=4.86; p<0.001$), and ASR-Internalizing classification ($X^2(1)=13.02; p<0.001$, Table 2).

Conclusions:

Consistent with child studies of parent-reported SRS, self-reported SRS-2:Adult scores and ASR scales for internalizing and externalizing scales were correlated. Although the SRS-2:Adult accurately classified 80-82% of participants, analyses suggested the instrument’s sensitivity differed depending on levels of externalizing behaviors. Taken together, preliminary results highlight a need to use multiple measures to characterize adult autism samples in order to inform interpretation of self-report measures intended to capture autism-related behaviors. Additional multivariate analyses will be conducted to explore factors affecting SRS-2:Adult scores, including gender and the relative contribution of different diagnostic scales (i.e., Depressive, Anxiety, ADHD), as well as co-occurring clinical diagnoses.

401.015 (Poster) Autism Spectrum Disorders, a Meta-Analysis of Executive Function: Un Update of 40 Years of Research

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Background:

Evidence of executive function (EF) difficulties in autism spectrum conditions (ASC) across development remains mixed, establishing its role is critical for guiding diagnosis and interventions.

Objectives:

The primary objective of this study was to provide an update of the previous meta-analysis reported in 2017 on EF performance in ASC compared to peers without ASC.

Methods:

The PRISMA-P guidelines were followed in developing the protocol which was registered with PROSPERO (CRD42021274347). The Embase, Medline and PsychINFO databases were searched to identify peer-reviewed studies published since July 2016 which were added to the studies reviewed in the original meta-analysis (1980 up to end of June 2016). The random effects model was selected, and a number of moderator analyses are planned. The primary outcome measure was Hedges’ $g$ effect size for EF and moderator factors.
Results:

Results will be reported according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The preliminary analysis identified an additional 123 studies that met eligibility criteria for the review. The total number of study participants was 26899 (N, ASC=13252, non ASC=13647). Preliminary results identified a moderate overall effect size for reduced EF (Hedges’ g=0.58, 95% confidence interval (CI) 0.51–0.65). This was attenuated when behavioural ratings were excluded from the overall analysis (Hedges’ g=0.50, 95% confidence interval (CI) 0.44–0.56).

Conclusions:

The findings confirm the broad EF difficulties identified in the original meta-analysis with implications for future support and remediation programmes.

401.016 (Poster) Autism and Aging: Genetic Genomic Perspectives

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Background:

Autism Spectrum Disorder (ASD) is a neuropsychiatric syndrome with high heritability (70-80%), whose phenotypic and genetic heterogeneity have challenged efforts to identify causal genetic factors. Nevertheless, the last decade and a half of genetic studies in ASD has yielded substantial advances in our knowledge of its genetic architecture, which is consistent with a significant effect of polygenic risk, as well as substantial contributions from rare de novo variation, including identification of over 200 high confidence risk genes. How these different genes impact specific clinical features is poorly understood, including how they impact disease trajectory over time, especially as it relates to aging.

Objectives:

Proposes a novel conceptual framework that examines the overlapping genetic and genomic architecture between ASD and neurodegenerative disorders of late life.

Methods:

This presentation integrates the literature, applies bio-informatic analysis of existing data, including new methylation data.

Results:

Despite the genetic and clinical heterogeneity in ASD, we have found that there is a shared molecular neuropathology in post-mortem brain from the majority of children and adults diagnosed with ASD. This includes a genetically driven down-regulation of synaptic signaling genes, including vesicle transport, mitochondrial energetics and activity dependent genes, concomitant with an up-regulation of neural immune signaling, including microglia and astrocytes. Remarkably, several of these pathways overlap with those changing in multiple neurodegenerative disorders, such as the down-regulation of neuronal energetics and the specific up-regulation of microglia and immune/inflammatory pathways. Whether these changes in ASD brain reflect accelerated aging or increased susceptibility, to disorders of aging are not yet known. But, these are critical to ascertain, given emerging clinical data on potentially increased risk for aging disorders involving mitochondrial dysfunction, such as Parkinson’s Disease. Moreover, ASD associated pathways based on known mutations include ubiquitination and protein homeostasis, which are also impacted in aging. The recent identification of the epigenetic clock, which is a highly accurate predictor of biological age based on DNA methylation, provides the opportunity to understand whether ASD broadly, or specific genetically defined forms, show advanced biological aging, data that we are currently analyzing and expect to present at IMFAR.

Conclusions:

Research in aging in ASD is at its very early stages. Advances in genomics allow us to examine whether aging trajectories are altered in ASD and how genetic factors impact aging in autism.

401.017 (Poster) Autism at 30: Daily Activities, Future Goals, and Normative Outcomes for Autistic Adults

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**Background:** Though most research on autism spectrum disorder (ASD) focuses exclusively on childhood, autism is a lifelong condition. While research on the transition to adulthood for adults with ASD and other developmental conditions like intellectual disability (ID) has surged in recent decades, research exploring “established adulthood,” defined as the stage from ages 30-45, remains sparse. Further, current literature tends towards deficits-based perspectives rather than exploring strengths of autistic participants’ lives. As such, it is unknown what happens to autistic adults with and without co-occurring ID in the decade after reaching adulthood.

**Objectives:**

1) Examine features of daily life for autistic adults in their early thirties and characterize their future hopes and goals.

2) Identify differences of participants’ daily lives and goals across intellectual ability (with and without ID).

**Methods:** 157 individuals (M_age=32.13 years, SD=0.12) from a longitudinal cohort studying autism were included, 67 without ID (verbal IQ ≥70) and 90 with ID (verbal IQ < 69). Participants were consecutive referrals to developmental clinics identified between ages 2-3 and followed for three decades. The sample was 19% Black, 18% female, 59% rural, and 44% had a parent not college educated. Standardized cognitive measures assessed IQ when participants were 18 years. Between ages 25-32, participants completed interviews and questionnaires about residence, employment and relationship history, generative activities, and desires for the future. For participants without ID, self- and caregiver-report data on future goals was analyzed. For participants with ID, caregiver-report data was analyzed.

**Results:** At age 32, 46.7% of participants resided with caregivers (51.7% with ID, 40.3% without ID). By age 32, 73.1% of participants without ID had been employed at least part-time and 52.2% full-time; 19.1% of participants with ID had been employed part-time. For participants without ID, 46.2% graduated from university, and 49% had been in a romantic relationship by age 32.

On average, participants engaged in a median of 2 independent enriching activities (with ID $m=2.21$, without ID $m=3.07$). Social activities were less common, particularly for participants with ID (Figure 1).

Adults without ID and their caregivers frequently reported goals of having children and partners (Figure 2). Across all participants, self-improvement goals were frequently identified: learning to cook, groom, drive, budget, and/or other practical goals for independence. Most goals for participants with ID mentioned developing life skills, gaining autonomy, and finding a supportive home and caregiver(s) for later life.

**Conclusions:** Regardless of diagnosis or ability, fundamental questions of how to live a fulfilling life are universal. This study attempts to expand traditional deficits-based approaches to meaningfully characterize activities and other strengths within this often-overlooked age group.

Further, these findings suggest the importance of distinguishing the differing needs of autistic adults with and without ID in certain contexts. These include employment expectations and interpersonal-based goals. In other contexts, like residing with caregivers and goals for greater independence, the lives and wishes of autistic adults across intellectual ability are similar. To our knowledge, this study is among the first to investigate such goals.

401.018 (Poster) Autism, Adulthood and Employment Challenges: The Double Empathy Problem Applied to Perceptions of an Autistic Employee in the Workplace

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**Background:** High unemployment rates are found among adults on the autism spectrum. Problems with social functioning in the workplace can be significant barriers to employment success. Traditionally, Theory of Mind (ToM) deficits have been proposed as the underlying cause of social difficulties for autistic individuals. Alternatively, the Double Empathy Problem (DEP) posits that the source of these social challenges lies not within ToM deficits, but in the potentially problematic interactions between autistic and non-autistic persons. Evidence for the DEP demonstrates that individuals within the autistic community have high quality social rapport and communication with each other, however, non-autistic individuals are more likely to misperceive the behaviors of autistic persons.

**Objectives:** Of the extant data regarding the DEP, there are no known studies using measurement methodology from the ToM literature, and also applying the DEP to autistic social interactions in the workplace. This study proposes to compare autistic and non-autistic participants’ ability to accurately interpret the behaviors of an autistic employee at work, using similar methodology to Happé’s strange stories ToM measure.

**Methods:** A sample of 255 participants (173 non-autistic, 82 autistic) read a vignette of a hypothetical autistic employee having difficulty coping in the workplace. Participants were not told that the character in the vignette was autistic. Participants then completed open-ended survey questions regarding their interpretation of the employee’s behavior. Participants also completed measures of autism traits and autism
knowledge, as well as questions about their general experience with autistic persons. Two independent raters blind scored the ToM responses of each participant.

Results: A significantly greater proportion of autistic participants accurately interpreted the behavior of the autistic character (ToM score = 2) in the vignette, compared to non-autistic participants (\(z = 8.65, p = .003\)). Logistic regression analysis that accounted for demographics and experience with autism, indicated being autistic (\(OR = 3.23, p = .008\)) and having increased autism knowledge (\(OR = 1.12, p < .001\)) as significant predictors of more accurate ToM scores.

Conclusions: Results from this study contribute to the growing field of evidence that supports the DEP, shifting the paradigm of autistic social functioning and interventions away from proposed autistic social deficits towards addressing problems in the autistic/non-autistic social interaction. Autistic persons in the workplace experience misunderstanding, stigma, social isolation, and employment failures. They also bear the burden of responsibility for trying to understand and cope in the non-autistic world of employment. Results of this study point to the responsibility of the non-autistic community to develop knowledge and understanding of the thoughts, feelings, and intentions of their autistic colleagues in the workplace. From the perspective of the DEP, helpful interventions would include instituting workplace autism education, acceptance, support, and accommodations. These interventions could help remove the barriers for autistic adults to obtaining and retaining employment, thus significantly impacting their adult functioning and quality of life.

401.019 (Poster) Autism-Related Language Preferences of French-Speaking Autistic Adults: An Online Survey

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Background:

In recent years, there have been increasing discussions surrounding the appropriate terminology to talk about autism. Initially, this debate revolved around the use of person-first language (e.g., person with autism) vs. identity-first language (e.g., autistic person) but has recently expanded to other autism-related terms (e.g., deficits). The language used to describe autistic individuals is not just descriptive, it reflects individuals' cultural view of a condition and can have real-life consequences for those directly concerned. One important step in reducing stigma is to change the way we talk about autism to reflect the opinions of the people directly affected by this issue. However, to date, studies investigating autism-related language preferences have been limited to English-speaking countries, and little is known about preferences in other languages.

Objectives:

This study addresses this gap by investigating the language preferences of 541 French-speaking autistic participants (formal diagnosis and self-identified) in an online survey. We are conscious that the target population (i.e., speaking autistic adults having access to computers) is not representative of the ideas and preferences of all autistic people. Nevertheless, we think that accounting for their voices is a first step to render autism research and terminology more inclusive.

Methods:

We used an online questionnaire to ask 541 French-speaking autistic adults what terms they prefer to use to refer to: 1) the nomenclature of autism (i.e., the diagnostic labels used to refer to autism as a neurodevelopmental disorder); 2) an autistic person; 3) someone’s autistic identity; 4) autism more broadly; 5) the abilities of autistic people and 6) people without a diagnosis of autism. Participants also had the opportunity to tell us more about their language preferences in an open comment. Figure 1 shows all the different options available for each category and their English translation.

Results:

As illustrated in Figure 1, the most preferred terms were 1) “Autisme” Autism (\(z = 14.97, p < .001\)); 2) “Personne autiste” Autistic Person & “Autiste” Autistic (\(z = 11.10, p < .001\)); 3) “Est Autiste” Is autistic (\(z = 14.05, p < .001\)); 4) “Différence neurologique/cérébrale” Neurological/ brain difference (\(z = 8.61, p < .001\)); 5) “Différences” Differences & “Difficultés” Difficulties (\(z = 11.97, p < .001\)); 6) “Neurotypique” Neurotypical (\(z = 6.58, p < .001\)). Participants’ open comments were also analyzed, revealing further support for identity-first language and the social model of disability, and a preference for simple, precise, and validated terms.

Conclusions:

We previously knew about language preferences of English-speaking autistic people. This study extends these findings by showing that French-speaking autistic adults also prefer terms that reflect the ideas of identity-first language and the social model of disability. We also
show that these are not the only reasons behind language preferences: term simplicity, precision and validity are also important when talking about autism. These results have substantial implications for informing the language of researchers, clinicians and other professionals in the field, as well as the general public.

401.020 (Poster) Autistic Characteristics and the Investigation of Homeless Risk and Protective Factors
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Background:
A number of risk factors may lead to an individual becoming homeless. These factors may include childhood factors, individual factors (mental illness, addiction), social networks size, structural factors (housing), prior homeless experiences, and social economic status. Certain populations may be vulnerable to the risk of homelessness, including individuals with mental health conditions, disabilities, and neurodivergence, due to their increased chance possessing these known risk factors of homelessness. Indeed, autistic individuals are represented within the homeless community. Emerging research has begun to investigate the specific nature pertaining to the homeless risk for autistic individuals. Previous research has outlined the increased presence of autism in the homeless community, and the need to focus on autistic characteristics that may increase the chance of homelessness.

Objectives:
This study focused on investigating three important factors; 1) The probability of homelessness according to the known risk factors of homelessness according to diagnosis, 2) the additional contribution of autistic characteristics, and 3) exploring the protective nature of social relationships and specifically parental relationships.

Methods:
Three hundred and thirty-seven individuals (Autistic spectrum Disorder: ASD and non-ASD) completed a questionnaire regarding known homeless risk factors and autistic characteristics. Bayesian hierarchical modelling was used to predict homelessness according to prior diagnosis and Autism Quotient (AQ) cut-off scores.

Results:
The results demonstrated that prior diagnosis predicted a lower probability of homelessness, yet those with high ASD characteristics without a diagnosis demonstrated an 85 % probability of a non-zero relationship with homelessness, whilst holding other factors constant. This suggest that there may be a high proportion of non-diagnosed autistic individuals in the homeless community. The results demonstrated autistic traits decreased the chance of homelessness for those with a prior diagnosis, compared to those without a diagnosis. When considering those without a diagnosis stronger evidence was detected for communication differences, attention switching, and attention to detail characteristics. Further investigation demonstrated that the difference between autistic characteristics was not meaningful, suggesting that collectively these symptoms increase the chance of homelessness rather than independently. In terms of protective factors, the diagnosis was seen as the biggest protective factor for those with ASD. For those high on autistic characteristics without a diagnosis, family plays an important role in protecting them from instances of homelessness. This differed from those with low number of autistic characteristics who were likely to receive protection from partners, friends, and service providers.

Conclusions:
The influence of autism (as indexed by the AQ) on homeless risk should be considered in light of the interaction with known risk factors SES, and social and individual factors. The protective nature of diagnostic assessment is clear, early detection and support may provide protection from homelessness. in the absence of a diagnosis, it is important to find ways to foster these social networks in order to prevent this group from becoming homeless.

401.021 (Poster) Autistics Workers Experience of Stress : A Cross-Sectional Descriptive
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Background: While work is an occupation that can be rewarding, and which can promote the well-being of those engage in it; it can also be a source of stress and anxiety. Challenges to obtain and maintain a job has been well documented among Autistics, in whom higher levels of
anxiety have traditionally been observed, which can be explained by their neurominority status (Botha, & Frost, 2020). Exploration from the autistic workers’ point of view regarding their experience of stress at work is therefore, the most important.

Objectives: To explore Autistics’ work-related experiences of stress, by documenting: i) the sources and manifestations of stress or anxiety; and ii) the strategies implemented to deal with it.

Methods: This study was based on a cross-sectional descriptive online survey, launched between June and October 2021. To take part in the study, participants needed to: i) be Autistics (≥ 18 years of age); ii) work in Canada at the time of the study; iii) be capable of completing the online survey, offering an introspective perspective at their working experience. The survey comprised 36 questions (25 multiple choices; 9 short open answers; 2 visual analog scales) divided in 3 sections: current work (10 questions) context, stress at work (18 questions), socio-demographic (8 questions). Quantitative data were subjected to descriptive statistics while qualitative data were subjected to a content analysis.

Results: 32 autistic workers participated in the study (40.6%; male; 43.7%; female; 9.4% non-binary (6.5% missing info) M:39.6 years old; SD:7.9). Most participants worked 33 to 40 hours/week (71.9%) in a large company (64.5%). Half of them worked outside their home and 40% telecommuted, one not excluding the other. Findings show that participants’ main sources of stress came from the physical and social environment, either originating from unpredictable events or situations (53.1%), social interactions (31.3%), work overload (28.1%), sensory overload (25.0%) or uncertainty or lack of clarity (21.9%). Physical (headache, stomach pain, insomnia, etc.) and psychological (irritability, impatience, negative thoughts, etc.) manifestations were reported as impacting participants beyond the workplace (e.g., lacking energy to do anything else after work (40.6%). Strategies to deal with stress were mostly put in place by the participants themselves, while 50% mentioned having some support from colleagues or superiors. A third reported they never received professional support to help them manage their stress.

Conclusions: Not all sources of work-related stress can be eradicated, if only because it would be utopian to think of eliminating all unpredictable events and issues. However, many sources of stress that are energy consuming for the Autistic workers could be reduced. Universal design principles – including sensory and cognitive accessibility which is often neglected could be applied to the workplace to make it a more autistic or neurodiverse friendly environment. In addition, Neuro-Affirmative supports and practices in the workplace are essential to reduce systemic barriers to job inclusion and retention for Autistics (and more broadly neurodivergent workers).

401.022 (Poster) Camouflaging Behavior, Internalizing Symptoms, and Social Support in Autistic Individuals and Individuals Who Have Lost Their Clinical Autism Diagnosis
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Background: Within autistic communities, camouflaging involves efforts to mask symptoms or actively blend in with others (Lai et al., 2019; Livingston et al., 2020). These efforts may be associated with internalizing symptoms, such as depression (Lai et al., 2017), though associations with anxiety are mixed (Cage & Troxell-Whitman, 2019; Schuck et al., 2019). Type and degree of camouflaging may interact with mental health outcomes (Hull et al., 2019) and individual and social factors. Our group studies individuals who were autistic early in development but no longer meet diagnostic criteria (i.e., they have lost the ASD diagnosis, LAD; Fein et al., 2013). To date, camouflaging has not been studied in LAD.

Objectives: We aimed to compare type and intensity of camouflaging in autistic, LAD, and neurotypical (NT) groups and examine associations between camouflaging type and intensity with internalizing symptoms and social support.

Methods: Adolescents and young adults (total n=72) completed videoconference interviews and online surveys. Groups did not differ on age, race, ethnicity, or family income. The NT group had more female-identifying individuals, and the ASD group had lower adaptive skills (Vineland Adaptive Behavior Scales). ASD was defined by clinical best estimate, based in part on ADOS-2 scores; Table 1. Camouflaging was measured via the Camouflaging Autistic Traits Questionnaire (CAT-Q; Hull et al., 2019) subdomains (Assimilation, Masking, Compensation). Caregiver-reported internalizing symptoms were assessed via the Achenbach Behavior Checklist subdomains (Depression, Anxiety, Somatic). Social support was assessed via the self-reported Multidimensional Scale of Perceived Social Support (MSPSS) subdomains (Total, Friend, Family, Significant Other Support). ANOVAs with pairwise comparisons assessed group differences and Spearman’s Rho correlations with FDR corrections probed for associations between camouflaging with internalizing symptoms and social support.

Results: Groups differed on CAT-Q Total and Compensation scores with medium and large effects (CAT-Q Total $\omega^2 = 0.07$; Compensation $\omega^2 = 0.13$; Table 2. The ASD group reported significantly more camouflaging and compensation than the NT group; LAD/NT and LAD/ASD scores did not differ. The ASD group reported more symptoms of anxiety and depression relative to LAD/NT groups. Only one correlation between Assimilation and Friends in the NT group remained significant following FDR correction ($p=.03$). LAD and ASD correlations were not significant.
Conclusions: Findings were consistent with prior work suggesting that autistic individuals engage in greater camouflaging behavior than NT peers and had more internalizing symptoms. LAD individuals displayed some camouflaging behaviors, suggesting that they face continued pressure to adapt behaviors in order to conform. Null associations between camouflaging and internalizing symptoms are consistent with some prior findings, but not others. Somewhat surprisingly, camouflaging was correlated with social support in the NT group only; feeling more supported by friends was related to fewer self-reported assimilating behaviors. These findings suggest that, at least in NT individuals, having supportive friendships may reduce the pressure to fit in with peers. Our ongoing research examines the role of social support and internalizing symptoms in autistic camouflaging behaviors to identify individual factors that may contribute to these relationships.

401.023 (Poster) Camouflaging Behaviors and Quality of Life in an Online Sample of Autistic Adults

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Background: Autistic self-advocates, family members, and community organizations have called for greater emphasis on enhancing quality of life (QoL) for autistic people. Prior research has found that autistic adults report a lower quality of life than the general population, particularly in domains such as meaning, purpose, and general life satisfaction. One potential explanation for this finding is that many autistic people are forced to camouflage their autistic traits due to the inequitable demands of living in an ableist society. Camouflaging includes masking (i.e., strategies used to hide autistic characteristics), assimilation (i.e., trying to blend into social situations), and compensation (i.e., strategies used to actively compensate for social difficulties). Emerging research suggests that camouflaging is negatively correlated with self-reported subjective wellbeing. To date, there is limited research exploring how the internal experiences and behaviors of autistic adults – including camouflaging – relate to their quality of life.

Objectives: Examine the relationship between quality of life and aspects of camouflaging (masking, assimilation, and compensation) in a sample of autistic adults.

Methods: One hundred sixty-two two-autistic adults aged 18 to 64 were recruited online. Participants completed the Camouflaging Autism Traits Questionnaire (CAT-Q) (producing total scores and compensation, masking, and assimilation factor scores) and the PROMIS Autism Battery-Lifespan (PAB-L) subjective well-being scales (general life satisfaction, positive affect, and meaning and purpose).

Results: In the primary analysis, CAT-Q total scores were used to predict each of the three PROMIS subjective wellbeing scales. Linear models revealed a significant main effect of CAT-Q total score on the PROMIS positive affect scale ($t = -2.63$, $p < .01$) and general life satisfaction scale ($t = -2.22$, $p = .03$), but not the meaning and purpose scale ($t = -1.68$, $p = .09$). The secondary analyses examined whether any of the single CAT-Q factor scores (assimilation, masking, compensation) accounted for the relationship between the CAT-Q total scores and PROMIS quality of life measures. Notably, across all three linear models, there was a significant main effect of CAT-Q assimilation scores on the PROMIS positive affect ($t = -5.86$, $p < .001$), general life satisfaction ($t = -4.51$, $p < .001$), and meaning and purpose ($t = -5.66$, $p < .001$) scales. There were no significant main effects of masking or compensation on any of the quality of life measures.

Conclusions: Research on the impact of camouflaging on autistic adults’ quality of life is in its infancy. Results from our primary analyses suggest that overall, greater self-reported camouflaging is related to poorer quality of life, specifically within the areas of life satisfaction and positive affect, but less clearly related to meaning and purpose. In addition, secondary analysis results suggest the relationship between self-reported camouflaging and quality of life variables were largely explained by the CAT-Q assimilation factor, such that greater self-reported assimilation was associated with poorer quality of life. Developing a more nuanced understanding of camouflaging behaviors, and how they relate to overall quality of life, is an important step towards ensuring that interventions are collaborative, client-centered, and promote autistic flourishing.

401.024 (Poster) Career Progression for Autistic People: A Scoping Review

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Background:

Across the globe, there is an ongoing autism-employment crisis, with fewer autistic people in paid employment than in the general population, and even compared to other disability groups. Of those autistic people who are employed, many are in roles that do not reflect their skills, qualifications, and/or capabilities. Research in this area primarily examines entry into the workforce for autistic people. Obtaining a job is, however, only one step in the employment pathway. We assert that it is equally important to understand autistic people’s experience of career progression.
Objectives:

This scoping review sought to explore what is already known about autistic peoples’ experiences of career progression. Specifically, we sought to understand:

1. What are autistic people’s experiences of career progression?
2. What barriers do autistic people face in progressing in their career?
3. What factors facilitate autistic people to progress in their career?

Methods:

Following Arksey and O’Malley’s (2005) five-step scoping review process, a comprehensive search of six databases was conducted, complemented by an additional Google Scholar search. Searches were limited to articles published in English, with no restrictions on publication date. Studies were included if they reported data on (1) autistic people’s experiences of career progression; (2) career success for autistic people (e.g., increased salary, hours, responsibility), or (3) job-matching. Undergraduate and Masters dissertations were excluded.

In total 1,352 articles were identified (see Figure 1). Screening of titles and abstracts was conducted independently by two researchers resulting in 117 studies eligible for full-text review (96% agreement). The full-text review was conducted by three researchers (90% and 78% agreement). Discrepancies were resolved via discussion.

In total, 33 studies met inclusion criteria. A narrative thematic synthesis approach was used to identify, review, and synthesise relevant findings across the eligible studies. Quality appraisal of the eligible studies is ongoing.

Results:

The included studies involved 1,478 autistic people, 156 parents of autistic people, 96 employers of autistic people, and 61 professionals that worked with autistic people (e.g., educators, job mentors). Overall, 1,613 autistic people were represented.

While career progression was desirable to many (but not all) autistic people, poor job-matching resulted in few opportunities to progress. Several barriers to career progression were identified. Having and/or disclosing an autism diagnosis was the most common barrier discussed (8 of 20 studies, 40%), followed by inadequate employment support (5 of 20 studies, 25%), and ‘spiky’ education and employment histories (3 of 20 studies, 15%). The eligible studies indicated that adequate employment support (e.g., via job-coaches, employment support programmes, or via family/peers) was a crucial enabling factor. Other enablers included tailored opportunities for progression, and the implementation of workplace adjustments.

Conclusions:

While 33 studies met criteria for inclusion, few studies explicitly mentioned career progression for autistic people, and no studies directly aimed to explore the topic. Indirectly, we identified several potential barriers and enablers to career progression for autistic people. By identifying such barriers and enablers, we can help shape future practice and research agendas on the topic, ultimately supporting more autistic people to have meaningful and successful careers.

401.025 (Poster) Characterizing Retained Autistic Adults in SPARK, a National, Online, Longitudinal Research Study of Autism


Background:

The SPARK study launched in 2016 to recruit and retain a cohort of individuals with autism of all ages and their family members across the United States. Few studies have followed children with autism into young adulthood. In SPARK, minors provide assent, if capable, and a parent or guardian provides consent on their behalf. These participants are asked to re-consent, if legally independent, when they turn 18. Challenges emerge around re-consent and engagement of young adults at a critical time of transition. Little is known about how this process impacts engagement with research in adulthood.

Objectives:
To characterize the cohort of retained young adults and compare their engagement in SPARK to that of young adults over age 18 when they initially enrolled independent of guardians.

Methods:

This study includes 2,942 independent adults, between the ages of 18 and 25 years when they joined SPARK, and 379 independent participants retained into adulthood (representing 30% of all enrolled adults who turned 18 reported as independent) of the same age. Data collected and utilized in the analyses include information about autism diagnosis; sociodemographic characteristics; and information about study tasks, such as the number of measures completed. Independent t-test was performed to compare cohorts by age at diagnosis, and chi-squares were performed to compare cohorts on other demographic and study task characteristics.

Results:

Retained adults typically were male (75%) and White, non-Hispanic (85%). Most lived in a metropolitan area (94%) in the south or west of the United States. The modal age at diagnosis was 3 years, with a mean age of about 8 years (SD=4.3 years). Independently consenting adults were demographically similar in many respects. A similar fraction live in a metropolitan area (91%) and identified as White, non-Hispanic (81%). Independent adults who consented at the same age (18-25) were significantly more likely to be female, \( X^2 (1, N = 3321) = 113.188, p < .001 \), more likely to have returned a biospecimen, \( X^2 (1, N = 3321) = 66.388, p < .001 \) and significantly less likely to agree to affiliate with, and be contacted by, a clinical site, \( X^2 (1, N = 3321) = 917.168, p < .001 \). They were also significantly older at age of diagnosis (M=11.8 years, SD=6.8 years). \( n(3211) = 10.74, p < .001 \). In fact, while the modal age at diagnosis for this group was 3 years, about 40% reported receiving a diagnosis in adolescence or adulthood. Finally, those enrolled as independent adults were more engaged with the protocol; 10% of retained adults completed a core protocol measure themselves, the Background History Questionnaire, in comparison to 42% of independent adults.

Conclusions:

Findings from this study underscore the challenges of both recruiting and retaining a longitudinal cohort of young adults who previously participated as dependent children in research. Those who continue participating as adults differ considerably from those who first joined SPARK as adults. We need to develop more effective means of engaging adolescents and informing them about the SPARK study before and during the age of transition.

401.026 (Poster) Charades, Collages, and Self-Advocacy: A Participatory Approach to Helping Autistic Students Build Community


Background: As the number of autistic university students grows, educators increasingly realize that autistic students experience not only difficulties with social interaction, self-advocacy, executive functioning, mental health, and stigma but also key strengths (Accardo et al., 2019a; Bakker et al., 2019) including heightened intellectual self-confidence, writing skills, and/or nonverbal intelligence (Bakker et al., 2019; Gillespie-Lynch et al., 2020; Sturm & Kasari, 2019). Evidence of autistic university students’ strengths became increasingly apparent as research designs improved. For example, Bakker, 2022 sampled the full student body of a university in the Netherlands, examining 7 cohorts of autistic students in relation to their peers with other disabilities or with no disabilities. Autistic students were often older on entry and progressed slightly more slowly but exhibited as much persistence as non-autistic students. Bakker recommended that institutions support autistic students by providing developmentally adapted supports that: 1) focus on support systems to help students transition into college, 2) help students understand what is expected at college, and 3) provide ongoing social and executive functioning support to reduce anxiety.

Objectives: To share strategies from Building Bridges Project REACH, a participatory mentorship program for autistic students and students with other disabilities.

Methods: The Project REACH model aligns with key principles Bakker recommends. Supports are individualized, as students can choose to participate in one-on-one mentorship and/or two types of group mentorship (a relatively unstructured Creative Exploration group or a structured Skills Development group). Students who are entering college are encouraged to attend group meetings the semester before if interested to acclimate to college. Student group leaders (and mentees) share what they’ve learned about college and strategies to develop executive functioning, self-advocacy, and employment skills in a supportive environment. Programming is free for students, who can participate in optional assessments for gift cards. Mentorship has been largely online since COVID-19 hit, with increasing hybrid options. Surveys assess students interest in learning and perceived skills in varied domains. They also assess anxiety, autistic identity, well-being, belonging, and ASQoL. Ten students did pre-tests in the Fall of 2021 and nine did post-tests. Twelve did pre-tests in the Spring of 2022 and 17 did post-tests.
Results: When asked if they liked on-line learning or in-person learning more, 8 students liked online and in-person the same, 6 liked in person better, and 3 preferred online. Students’ self-reported skills tended to improve numerically from the beginning to the end of the Fall term (Table 1). Improvements were significant for self-advocacy and job skills ($ps < .05$). While students’ self-reported skills generally continued to improve numerically in Spring 2022, no skill improvements were significant in the Spring (Table 2). However, ASQoL improved from the beginning to the end of the Spring ($p < .05$).

Conclusions: Project REACH has continued to be a vibrant space for neurodivergent students to connect and share experiences during the pandemic. Students are not as interested in completing surveys as they were pre-pandemic but provide useful feedback to guide program development in end-of-session exit tickets. Student leaders have guided REACH to keep innovating.

401.027 (Poster) Community Participation Amongst Autistic Adults: The Impact of Leisure Activities on Quality of Life

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Background: Autistic adults consistently report lower quality of life (QoL) than non-autistic adults and have flagged this dynamic as a priority for clinical research in this field. The recent literature has established a variety of potential predictors of poor QoL, including autistic traits and employment (Mason et al., 2018), though findings have been largely mixed to date. Notably, the positive impact of community participation on QoL has been well documented in non-autistic samples and has recently been highlighted as an important area for further exploration with autistic adults (Cameron et al., 2022).

Objectives: This study aimed to explore the effects of community participation on caregiver-reported QoL in a diverse sample of autistic adults diagnosed as children through the UNC TEACCH Autism Program between 1969 and 2000.

Methods: As part of a larger longitudinal study, caregivers of 268 middle-aged autistic adults (average age=35.32; average childhood IQ = 61.12) completed an 87-item survey regarding the autistic adults’ current functioning and daily life along with standardized measures of autistic traits (SRS-2) and QoL (Quality of Life Questionnaire). Independent samples t-tests were computed to assess for significant differences in QoL based on autistic adults’ participation in various types of community activities. A hierarchical linear regression model was then performed to assess the cross-sectional predictive value of recreational participation on QoL when controlling for other known predictors (e.g., childhood IQ, employment status, autistic traits).

Results: Caregiver report indicated that autistic adults who had participated in at least one kind of community activity over the last year ($n=224, M=78.75, SD=14.43$) experienced significantly higher QoL than autistic adults who had not ($n=28, M=72.04, SD=12.43$) ($t(250)=-2.36, p<.05$). Specifically, autistic adults who had taken lessons (e.g., art, music, dance, foreign language, computers; $n=49, M=85.94, SD=13.22$), attended religious services ($n=140, M=81.12, SD=14.43$), gotten together with friends outside of organized activities ($n=89, M=86.62, SD=14.43$), or had been invited to others’ social activities ($n=77, M=86.10, SD=14.63$) reportedly experienced significantly greater QoL than those who had not. There were no significant differences in QoL based on more structured activities (e.g., participation in social skills groups or volunteer work). Furthermore, the hierarchical linear regression model was significant ($F(4, 208)=100.75, p<.001$, $R^2=.66$); even when controlling for childhood IQ ($B=.04, p=.11$) and other known predictors including current employment ($B=12.95, p<.001$) and current autistic traits ($B=-.51, p<.001$), participation in community activities remained a significant predictor of QoL ($B=2.21, p<.001$) such that those autistic adults who engaged in more recreational activities reportedly experienced higher QoL.

Conclusions: In this study, community participation in leisure activities significantly impacted caregiver-reported QoL for autistic adults beyond current intervention targets (i.e., employment, social responsiveness). These findings emphasize the importance of community participation as a meaningful form of intervention to improve QoL in the autistic community. Further work is needed to explore the specific benefits of community participation (e.g., social opportunity, executive function skill building, behavioral activation) as well as its direct impact on QoL through longitudinal follow up.

401.028 (Poster) Comparing Physical Activity and Sedentary Behaviours of Autistic Adults and the Non-Autistic Peers

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Background:

Background: An expanding evidence base indicates that autistic adults experience worse health outcomes than their non-autistic peers. Autistic adults have been observed to experience obesity and cardiovascular disease at three times the rate of non-autistic peers. Furthermore, autistic adults experience diabetes at approximately twice the rate of their non-autistic peers. This relationship is observed in almost all chronic diseases, whereby autistic adults relative prevalence is higher than their non-autistic peers. These chronic diseases can be
linked to lifestyle changes, such as insufficient physical activity and high levels of sedentary behaviours. There is currently limited reliable data regarding volumes and patterns of physical activity and sedentary behaviours in autistic adults. The current evidence suggests that autistic engage in lower volumes of physical activity than their non-autistic peers. It is currently unclear how the patterns of physical activity and sedentary behaviours compare between autistic adults and their non-autistic peers.

Objectives: The objective of this study was to characterise the volumes and patterns of physical activity and sedentary behaviours in autistic adults compared to their non-autistic peers.

Methods:

A case-control design was used to compare matched autistic and non-autistic adults. A total of 36 participants were recruited and matched based on age, gender, body mass index and estimated metabolic equivalent of task derived from the International Physical Questionnaire-Long Form.

The sample included 16 autistic adults (mean age = 29.1; SD= 8.1 years; 10 male, 6 female) matched with 16 non-autistic peers (mean age = 27.4; SD= 8.7 years; 10 male, 6 female).

The matched participants wore an activPal accelerometer over seven days to ascertain device-derived volumes and patterns of physical activity. The data were compared using unpaired t-tests.

Results:

Significant differences were noted between the sitting time of autistic and non-autistic peers (p=0.04). However, no differences were noted between the volumes of stepping and standing time. When examining the patterns over a seven-day period several statistically differences were noted. The data showed that the autistic group spent significantly less time stepping and had a lower total step count on Sundays, Mondays and Tuesdays when compared to non-autistic peers. Time spent in sitting was significantly higher for the autistic group on Tuesdays, Fridays and Sundays. Time spent in prolonged sitting was significantly higher for the autistic group on Mondays, Thursdays and Sundays. Time spent in standing was significantly higher for the neortypical group on Tuesdays and Sundays only. For the remaining days of the week, differences in patterns of PA and SB were not significantly different.

Conclusions:

The results of this study suggest that the differences in the volumes of physical activity and sedentary behaviour between autistic adults and their non-autistic peers may not be as pronounced as previously thought. However, the patterns of physical activity and sedentary behaviour are considerably different on several days of the week. It is possible that the increased rates of lifestyle diseases may be related to these different patterns of physical and sedentary behaviours.

**401.029 (Poster) Dating and Romantic Relationship Desires in Autistic Adults: Understanding Their Experience**

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Background: Sexuality and dating for autistic adults has become an area of increased focus and research in recent years (Dewinter et al., 2020). It has also become a socially relevant topic with increased attention and representation of autistic adults as sexual beings in the media (Brooks, 2018). Sexuality and dating are important component of living a healthy and successful adult life, yet little is still known about the direct dating experiences of these adults, and what cultural differences may be present in these experiences (McMahon et al., 2021) It is important to learn more about these experiences to know what should be attended to when developing services such as dating apps or social skills programs.

Objectives: This study aims to explore the dating experiences of autistic adults to determine challenges, strengths and goals related to these experiences.

Methods: Semi-structured clinical interviews were conducted with 31 autistic adults (M_{age}= 25, SD = 5.5; 84% males) by doctoral-level trained clinicians. Interview questions regarding previous dating and relationship experiences as well as desires for future experiences were asked, including a mixture of quantitative queries (e.g. how many committed relationships have you been in) and qualitative questions (e.g. what are your biggest dating concerns). Transcriptions of the interviews were then analyzed using a thematic content analysis (Braun & Clarke, 2006) by two researchers with a background in disability and sexuality. Data were first analyzed by researchers separately at a semantic level, and then themes were discussed and created at the latent level of analysis and merged to inform the results (Creswell, 2007).
Results: Twenty-seven participants identified their sexual orientation as straight, two as bisexual, and two were unreported. Initial results indicated that the majority (17) of participants indicated no previous dating experience. Of the 14 with dating experience, most described having been on less than 5 dates total and indicated they met these people in-person. Across all participants, 23% indicated they had tried online dating but had been unsuccessful. Only seven participants reported having been in at least one previous committed relationship. Participants often described feeling unaware of how to be in a successful relationship, and 26% of participants described experiencing exploitative or inappropriate relationships or dating experiences. Overarching themes regarding dating challenges centered around issues related to flirting and engaging in conversations on dates, as well as understanding and enforcing relationship boundaries and avoiding exploitation. The most common relationship goal involved finding a long-term partner.

Conclusions: This study provides further insight into the dating experiences and desires of autistic adults. Results show that these adults often struggle with the nuances of dating (flirting, boundaries, etc.) and would benefit from direct instruction in these areas. Additionally, results suggest that while the majority of these adults are lacking any dating or relationship experience at all, they still desire these experiences. Further research and community programming should look into providing and tailoring dating resources and experiences for autistic adults.

401.030 (Poster) Mental Health and Heterosexist Discrimination Among Autistic-LGBTQ+ Individuals

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Background: In recent years, there has been an increase in research focused on the higher likelihood of being a sexual minority or lesbian, gay, bisexual, or queer (LGBQ+) among autistic individuals (George & Stokes, 2018). Both autistic and sexual minority individuals are more likely to experience heightened psychological distress than their non-autistic and heterosexual counterparts. The minority stress model explains these mental disparities as being related to the impact of both distal and proximal stressor events, which in turn negatively impact the mental health outcomes of sexual and gender minority individuals (Meyer, 2003; Hendricks & Testa, 2012), and more recently, autistic individuals (Botha & Frost, 2020). Heterosexist or prejudicial events differentially impact the mental health of individuals with multiple marginalized identities (Balsam et al., 2011), as exemplified by research on autistic-LGBTQ+ people, which has documented worse mental health outcomes among transgender autistic people (as compared to cisgender autistic counterparts), including lower well-being and higher stress (George & Stokes, 2018).

Objectives: In the present study, we analyzed archival data from an intervention study designed to cope with heterosexist stigma through expressive writing interventions. For the present study, we analyzed the baseline data of participants who identified as autistic and LGBQ+ to explore the relationship between heterosexist discrimination, gender expression, and mental health.

Methods: Participants (N=54) all identified as a sexual minority and autistic (both diagnosed and self-identified), and more than half identified as transgender, nonbinary or gender diverse. We collected data on depressive symptoms, the impact of trauma/stressor symptoms, and negative affect. Multiple linear regression was used to examine the relationship between heterosexist stigma (HHRDS; Szymanski, 2006), discrimination based on gender expression (DHEQ; Balsam et al., 2013) and trauma/stressor symptoms (IES-R; Weiss & Marmar, 1996).

Results: Approximately 75% of the sample endorsed clinically significant depressive symptoms, while 62% endorsed PTSD symptoms of clinical concern. 87% of participants rated their chosen heterosexist event from moderately to extremely distressing. Participants varied in their levels of outness and came out to themselves as LGBQ+ at an average of 16.6 years of age. Most were out to friends and family, although approximately 14% reported that they had not come out to parents, with several noting they did not intend to due to worry about rejection. Results indicated that the model explained 45.3% of the variance and that the model was a significant predictor of trauma/stressor symptoms, F(2,51) = 22.9, p = .001.

Conclusions: The high rates of mental health distress in this non-clinical sample are notable because participants were recruited based on their autistic-LGBTQ+ status and the presence of a troubling heterosexist event rather than for elevated scores on measures of depression or trauma. Participants who present with more gender nonconformity in their gender expression may be more likely to experience heterosexist discrimination and be at risk for developing heightened stressor symptoms. Clinical interventions and conceptualization should attend to the role of sexual minority-based stigma related to elevated mental health distress, which will be discussed by the presenters.
Background: Evidence suggests that autistic individuals achieve relatively lower education levels than others; however, existing studies employ relatively small samples (<7700 autistic individuals) and fail to consider the educational attainment of non-autistic individuals with high autistic traits, henceforth high AQ.

Objectives: To understand the educational attainment patterns of autistic and high AQ individuals in the United Kingdom (UK).

Methods: This study leveraged responses to a self-report, cross-sectional, online survey. Autistic and high AQ individuals were matched to non-autistic individuals exactly 5:1 on age, gender, and UK region. Autism status was self-reported. Autistic traits were measured by the 10-item version of the Autism Spectrum Quotient (AQ-10), with a score ≥6 corresponding to high autistic traits (vs. low autistic traits). Adjusted binomial logistic regression models assessed educational attainment at the following levels: (1) less than A-level qualifications, (2) A-level qualifications, (3) undergraduate qualifications, or (4) postgraduate qualifications and controlled for age, gender, UK region, ADHD, bipolar disorder, depression, learning disability, OCD, and schizophrenia. A p-threshold of 0.005 was employed to account for multiple testing.

Results: The study comprises two samples: (1) n=14,519 autistic vs. n=72,595 non-autistic individuals, and (2) n=37,458 non-autistic individuals with high autistic traits (high AQ) vs. n=187,290 non-autistic individuals with low autistic traits. Both samples were biased toward women, younger participants, and specific regions within the UK. As expected, there were group differences in AQ-10 score and rates of neurodevelopmental and psychiatric conditions.

Using group differences in university-level qualifications as a reference-level, we found that autistic and high AQ individuals were over-represented among those with ‘less than A-Level’ or ‘A-level’ qualifications. Autistic individuals were also marginally over-represented among those with ‘Postgraduate qualifications’; however, the opposite pattern was seen among high AQ individuals—who were markedly less likely to complete postgraduate qualifications than matched controls. Further analysis of gender-stratified samples revealed that this effect was driven by high AQ women exclusively.

Conclusions: Using the largest sample to date, this study illustrates that both autistic and high AQ individuals are dramatically over-represented at relatively lower levels of educational attainment. These results underline that current educational systems are failing to meet the needs of individuals diagnosed as autistic as well as a much broader group along the spectrum of autistic traits. Interestingly, a greater number of autistic individuals than expected (based on group differences in university-level qualifications) achieved a postgraduate degree compared to demographically-matched peers (10% vs. 11%); yet high AQ women were less likely to achieve a postgraduate degree than demographically-matched peers (15% vs. 18%). These results may suggest that a subset of autistic individuals manage (or receive appropriate support) to achieve postgraduate degrees, but that these same advantages are not afforded to high AQ females. It should be noted that the sample is likely subject to a range of biases due to its convenience-sampling and self-report design. Thus, these results must be confirmed in large, population-based studies. Nevertheless, these findings highlight possible benefits of obtaining a diagnosis (particularly for females/women who may have greater barriers to timely diagnosis) and have clear implications for educational policies.

401.032 (Poster) Do Autistic LGBTQ+ Adults Report Greater Depression & Anxiety Symptoms Compared to Their Autistic Non-LGBTQ Counterparts? A Large-Scale Survey Study


Background: The Minority Stress Model proposes that minority statuses, such as autism, and the stress and oppression minorities experience may contribute to increased mental health challenges (Botha, Frost, 2018). Dual minorities are people who identify with two minority groups, and thus may face even more stress, and predisposition to mental health challenges. LGBTQ+ autistic adults are twice as likely to have a psychiatric diagnosis compared to their non-LGBTQ+ autistic counterparts (Hall et al., 2020). In our previous poster, we measured co-occurring mental health diagnoses using a single self-report survey item and found that dual minority statuses of autism and LGBTQ+ are associated with higher rates of co-occurring conditions such as depression and anxiety.

Objectives: 1) To examine if autistic adults in the LGBTQ+ community have more symptoms of depression and anxiety, as measured by the BDI-II and GAD-7, than non-LGBTQ+ autistic adults 2) To examine if a greater proportion of LGBTQ+ autistic adults in this sample meet clinical cutoffs for depression and anxiety (on the BDI-II and GAD-7) than their non-LGBTQ+ autistic counterparts.

Methods: “Surveying Thinking Patterns and Health in Adults with Autism Spectrum Disorder” is an online SPARK Research Match study that includes participants (aged 18-45 years) with a self-reported or professional diagnosis of autism. A self-report survey was used to collect demographic information, including information regarding co-occurring diagnoses. There was no item that asked specifically about LGBTQ+ identity, and thus, in this study we define LGBTQ+ status as an inclusive grouping of any participants who did not identify as cisgender and heterosexual. Chi-square tests, Fisher's exact test, and independent sample t-tests were used to compare LGBTQ+ and non-LGBTQ+ autistic adults on demographics, BDI-II and GAD-7 total scores. Raw scores of 20 or greater on the BDI-II indicate moderate or severe depression symptoms. On the GAD-7, a raw score of 10 and above indicates moderate to severe anxiety.
Results: 610 autistic participants (Mage= 30.8 years old) completed the survey. Forty-five percent (n= 280) identified as LGBTQ+ (non-heterosexual and/or non-cisgender). On average, participants reported mild depression and anxiety symptoms (Table 1). LGBTQ+ autistic participants reported significantly greater depression symptoms and greater anxiety symptoms compared to their non-LGBTQ+ counterparts (Table 1). A greater proportion of autistic LGBTQ+ participants met clinical cutoffs for moderate and severe depression (LGBTQ+ 52.5%, non-LGBTQ+ 38.8%, p=0.001) and anxiety (LGBTQ+ 45.4%, non-LGBTQ+ 33.9%, p=0.005) than non-LGBTQ+ autistic adults.

Conclusions: We found that autistic LGBTQ+ adults report significantly more symptoms of depression and anxiety compared to their non-LGBTQ+ counterparts. Recent work shows that LGBTQ+ autistic adults face numerous barriers in accessing healthcare (Hall et al., 2020). Our findings underscore the fact that clinicians should provide necessary resources including LGBTQ+ and autistic-affirming mental health supports. Future studies should examine racial differences as an additional minority status affecting mental health outcomes for autistic LGBTQ+ people, and large survey studies with autistic participants should routinely collect data on sexuality and gender identity.

401.033 (Poster) Masking Among Gender Minority Autistic Adults
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Background: Autistic masking/camouflaging is an emerging area of research that focusses on understanding the attempt to suppress/manage aspects of autistic identity, or use non-native social and/or cognitive strategies. Recently, there has been a concerted effort to understand whether and how masking might contribute to diagnostic biases. To date, much masking research has focussed on differences in masking between cisgender men and cisgender women, with small numbers of trans and/or non-binary (TNB+) participants. It is important that samples in autism research are gender diverse, as having multiple social minority identities can result in intersecting, compounding, or interacting forms of stress including more complex masking.

Objectives: We aimed to examine the experiences of masking in TNB+ autistic adults, in order to understand how having a dual minority identity impacts on autistic people.

Methods: We recruited 230 TNB+ autistic adults to take part in the current study via social media (e.g. reddit). Participants had to be over the age of 18 to take part, but no further exclusion criteria applied. The sample comprised 173 non-binary people, 23 trans women, and 34 trans men.

This study had a mixed methods design, collecting both quantitative (not discussed here) and qualitative data. Participants completed the study via an online survey hosted on the platform Qualtrics. The qualitative questions focussed on how people mask, the contexts they mask in, reasons for masking, and how they feel about their own personal identity. We analysed the data using reflexive thematic analysis.

Results: Participants described masking both autistic characteristics (e.g. forcing themselves to make eye contact, avoiding stimming) and their gender (e.g. trying to appear more masculine). Many participants reported work and socialising as primary contexts for masking, but many people felt that they masked everywhere, even when alone. Social pressure and wanting to appear ‘normal’ drove masking, in addition to wanting to be liked, and avoiding victimisation. Many people reported feeling a loss of identity, not knowing who they were, and only feeling safe around similar others who could validate them.

Conclusions: Our findings suggest that autistic people with dual minority identities may engage in masking across multiple aspects of identity. Some aspects of masking are specific to being autistic (e.g. suppressing stims) and some are a more general artefact of stigma (e.g. avoiding discrimination).

401.034 (Poster) Employment Sector Distribution of Autistic Employees Compared to the Netherlands Workforce
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Background:

Most adults spend the greater part of their waking hours at work, making employment participation a fundamental part of adult life. Previous research on employment outcomes of autistic adults commonly assessed if they work and under what terms, with mostly anecdotal descriptions of where they work. There is a common assertion that autistic people are more fitted for the Information Technology (IT) sector (Bury et al., 2019), due to characteristics such as preference for detail-oriented task or a tendency towards systemizing (Baron-Cohen et al., 2009; Simmons et al., 2009). At the same time, job-interests of autistic adults appear to expand to other directions, such as human and social sciences and creative fields (Kirchner & Dziobek, 2014). Additional studies offer an in-depth understanding of employment experiences of autistic professionals in performing arts (Buckley et al., 2021) and teaching (Wood & Happé, 2021). Thus, broad participation of autistic employees in various job-market sectors is probable, but not supported by evidence.
Objectives:

The study aimed to identify employment sector distribution of autistic employees compared to the Netherlands workforce, and to explore if background variables can predict sector integration.

Methods:

Participants included 1115 employed autistic adults (476 male, 627 female, 12 other; mean age: 40.75) registered at the Netherlands Autism Register, who completed questionnaires assessing employment sector, gender, age, age at diagnosis, level of education, degree of autistic traits (AQ-Short; Hoekstra et al., 2010) and presence of focused interests. Netherlands workforce data was retrieved from the Centraal Bureau voor de Statistiek (CBS). Absolute numbers were transcribed into proportions for each group, and split by gender. Sector-distribution differences across the two populations were tested with Mann-Whitney U-test. To test predictions, binary logistic regressions were employed for the three most common sectors of autistic employees.

Results:

Significant differences in the distribution of occupational sectors were found across the two populations ($U=83, p<.05$). Autistic adults were over-represented in the healthcare & welfare sector, the public-army-charity sector and IT, which were the three most-common sectors of employment (20.2%, 13.1% and 10.7% respectively). Under-representation of autistic employees was found in economics & finances, and industry & construction sectors. Splitting sector-distribution by gender showed that most autistic employees in the healthcare and welfare sector were females (Figure 2). Accordingly, working in healthcare and welfare was predicted by gender. Level of education and gender predicted placement in IT, but the proportion of autistic females working in IT was higher in comparison to females in the Netherlands workforce. Other tested variables did not predict specific sector integration.

Conclusions:

The widespread distribution of autistic employees between job-market sectors supports the need to for an individual approach tailoring each person’s needs and characteristics in making employment decisions. Greater job-marked diversity can promote realization of talent, leading to personal, social and economic benefits. While a relatively high representation of autistic employees in IT aligns with previous assumptions, the less expected high proportion of autistic women in healthcare and welfare may spark new insights and initiatives related to career integration for autistic women.

401.035 (Poster) Mental and Physical Health and Healthcare Utilization for LGBTQA+ Autistic Adults: Compounded Inequities


Background: Research has demonstrated that a substantial group of autistic adults are LGBTQA+. Both LGBTQA+ adults and autistic adults experience health inequities, and holding these intersecting identities may compound mental and physical health inequities. Information about autistic LGBTQA+ health outcomes and healthcare utilization can be used to inform targeted interventions.

Objectives: We used cross-sectional electronic medical record (EMR) data (2015-2019) to examine health outcomes and healthcare utilization patterns of autistic LGBQ and transgender (TG) adults compared to autistic cisgender heterosexual (CH) adults.

Methods: The setting was Kaiser Permanente North California (KPNC), a large integrated healthcare system serving over 4.3 million members. Participants were all individuals with an autism diagnosis recorded in their EMR by January 1, 2015. LGBQ individuals were identified via a self-report questionnaire and TG individuals via a stepwise method involving computerized searches of EMR and free-text clinical notes for stakeholder generated diagnostic codes and keywords, followed by chart review for eligibility. Multivariate logistic regression controlling for age, race/ethnicity, and (for LGBQ models only) gender were used to investigate differences in outcomes and utilization. Utilization models also controlled for health diagnoses.

Results: Of 4160 autistic participants, n=122 were identified as LGBQ and n=90 as TG. CH participants were older on average (M=29 years) than LGBQ (M=27 years) and TG (M=23 years). Compared with autistic CH, autistic LGBQ and TG were 2-5 times more likely to be diagnosed with mental health conditions including anxiety (LGBQ: OR=2.7, CI [1.8-3.9]; TG: OR=5.1, CI [3.2-8.4]) and depression (LGBQ: OR=2.9, CI [2.0-4.3]; TG: OR=4.5, CI [2.9-7.0]). LGBQ were more likely than CH to have diagnoses of alcohol (OR=3.8, CI
Compared with autistic CH, autistic LGBTQ were also more likely to have physical health diagnoses including pain (LGBQ: OR=2.9, CI[1.8-4.5]; TG: OR=2.4, CI[1.7-3.5]), migraine (LGBQ: OR=2.0, CI[1.2-3.5]; TG: OR=2.4, CI[1.4-4.4]), gastrointestinal disorders (LGBQ: OR=2.4, CI[1.6-3.5]; TG: OR=2.2, CI[1.4-3.4]), genitourinary disorders (LGBQ: OR=2.7, CI[1.6-4.3]; TG: OR=2.5, CI[1.4-4.5]), hypermobility syndrome (LGBQ: OR=43.6, CI[6.5-293.4]; TG: OR=38.9, CI[6.2-244.6]) and fibromyalgia (LGBQ: OR=2.8, CI[1.5-5.5]; TG: OR=3.7, CI[1.7-7.9]). Additionally, LGBQ were more likely than CH to have autoimmune conditions (OR=1.5, CI[1.0-2.3]) and renal disorders (OR=2.0, CI[1.3-3.1]).

In terms of healthcare utilization, LGBQ were more likely to have laboratory (OR=2.5, CI[1.4-4.5]), OB/GYN (OR=3.0, CI[1.9-4.8]), radiology (OR=1.7, CI[1.1-2.6]), other specialties (e.g., dermatology, sleep medicine; OR=2.0, CI[1.2-3.2]) or emergency department visits (OR=1.6, CI[1.0-2.3]). TG were more likely than CH to have mental health (OR=1.8, CI[1.1-3.0]) or other specialties visits (OR=3.2, CI[1.7-6.1]).

**Conclusions:** Compared to autistic cisgender heterosexuals, autistic LGBTQ adults experience health disparities, have higher rates of mental and physical health conditions, distinct patterns of healthcare utilization, and may need specialized supports. Healthcare providers across many different specialties must anticipate and be trained to provide care for autistic LGBTQ people in order to promote mental and physical health and health equity for this population.

401.036 *(Poster)* Equal Opportunities of Autistic Women in Working Life - Results of the Project AUT-CIA
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**Background:**
A whole series of international studies as well as quite a few national references draw attention to the fact that women and girls with high-functioning autism (HFA) or Asperger's syndrome (AS) experience disadvantages in the world of work compared to the male gender, which make it more difficult to enter the workforce and lead to higher stress levels and adaptation problems. This leads to frequent job changes and even complete withdrawal from the workforce. Evidence to date suggests that the expectations women with autism face in the workforce lead to specific occupational stresses that differ from the challenges and stresses faced by autistic men. (Literature references in the full text).

**Objectives:**
However, there is a lack of knowledge as to what the particular stresses can be attributed to and what assistance women need in order to remain sustainably employed in their working lives and to find stabilization in their personal development. For this reason, the project AUT*CIA - Equal Opportunities for Severely Disabled Women with HFA/AS in Working Life was initiated. The project is designed as a practical research project.

**Methods:**
In a first step, the problem situations and support needs of women with HFA/AS are elicited using a mixed-method approach. This paper presents the results of the quantitative survey. The online questionnaire was sent nationwide (Germany) to over 6500 institutions dealing with the topic of autism and the link was published in various groups in social media. In order to be able to generate comparative data, the survey was directed at to autistic persons of every sex. (Response: N=840: male n=356; female=463; diverse=48).

**Results:**
The present study shows that autistic women are disadvantaged in all areas of life. With a mean value of 30 years, the age of diagnosis of the autistic women involved is higher than that of the men (21 years). Autistic women show more pre-diagnoses (f=62%; m=40%) as well as comorbidities (f=83%; m=73%). Both the assessment of life satisfaction (dissatisfied: f=44%, m=38%) and job satisfaction (dissatisfied: f=39%, m=28%) are lower among the autistic women surveyed. The assessment of various areas of life is also more negative among women. The most stressful areas of life are the job search (80%), own health issues (68%) and employment. Just under a third (30%) of the women surveyed stated that they were unemployed. The need for support at work is rated higher by women than by men. The need for support in solving conflicts within the team is rated as high or very high by 54% of the women and represents the highest category. Only 38% of the women surveyed feel sufficiently supported.

**Conclusions:**
The establishment and expansion of gender-specific counseling and support services must be promoted. The focus must be on all areas of life. Starting with improved access to diagnostics, to counseling services concerning the organization of private life, to support measures at the workplace in order to reduce the specific burdens and to sustainably increase the participation of autistic women in the workforce.

**401.037 (Poster) Examination of Prevalence Rates, Psychological Correlates, and Treatment Outcomes Among SGM and Non-SGM College Students with and without ASD**

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Background: Both the prevalence rates of young adults diagnosed with autism spectrum disorder (ASD; Bakker et al., 2019) and those identifying with a sexual and gender minority (SGM) group (ACHA, 2020) have been increasing each year. While both ASD and SGM status are independently associated with a myriad of psychiatric conditions and functional impairments, research focusing on their intersection has been limited, especially among college students. Prior studies suggest SGM individuals with ASD face more barriers to healthcare access compared to non-SGM individuals (Hall et al., 2020). However, the extent to which these findings are driven by SGM status, a diagnosis of ASD, or their compounding effects associated with each is unknown. Understanding these topics are important, given theoretical models (minority stress theory, intersectionality theory) indicating that individuals belonging to minority groups tend to experience higher rates of mental health problems due to compounding stressors that may be further exacerbated in the presence of two or more intersecting minority identities (Meyer, 2003; Crenshaw, 1989).

Objectives: The current study builds on existing literatures on ASD and SGM and is the first to examine prevalence rates, associated functional impairments, and treatment engagement levels for SGM and non-SGM populations with and without ASD via a large nationwide college-student sample cross-sectionally across 3 years.

Methods: Analysis were completed using data from the American College Health Association-National College Health Assessment (ACHA-NCHA) III. Participants included 82,030 college students between the ages of 18-25 years old randomly selected from 75 US colleges and universities. ACHA-NCHA-III measures assessing demographics, self-reported ASD diagnosis, self-reported SGM membership status, mental health symptomatology, stress, and academic impairment were used for analyses. Participants were assigned into one of four groups based on their reported ASD and SGM statuses: ASD-only (n=567), ASD+SGM (n=489), SGM-only (n=17,507), and control (n=63,3467). Analysis was conducted using MANCOVAs, ANCOVAs, and chi-squared tests to assess 1) the prevalence rates of ASD within SGM and non-SGM groups, 2) group differences among psychological correlates (i.e., stress, resiliency, loneliness, non-suicidal self-injurious behaviors, etc.) and associated academic impairments, and 3) group differences across treatment engagement levels.

Results: Results indicated ASD prevalence rates were significantly higher in the SGM-only group (2.7%) as compared to the non-SGM group (0.9%), χ²(1)=370.94, p<.001. Group differences emerged for psychological correlates and academic impairments (all p’s <.05). Follow-up pairwise comparisons will be presented and discussed in detail. Data analyses for examination of group differences across treatment engagement is currently ongoing and is expected to be completed prior to 2023.

Conclusions: This study provides a comprehensive view of the prevalence rates, associated psychological correlates, and treatment engagement outcomes experienced by SGM and non-SGM college students with and without ASD. Conclusions of this study suggest important implications for college students with these intersecting identities, including overlapping treatment goals in counseling centers and enhanced college supports.

**401.038 (Poster) Examining Physical and Mental Health Service Needs, Conditions and Other Correlates of Subjective Well-Being of Autistic Adults**

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Background:

Mental health research involving autistic adults has historically focused on psychopathology. The growing field of positive psychology seeks a different perspective, viewing life from the angle of what makes it worth living (often termed “subjective well-being”), rather than solely focusing on what is wrong. The PERMA Profiler, a 23-item self-report measure, encapsulates the construct of well-being across five domains (Positive emotion, Engagement, Relationships, Meaning, Accomplishment), though a prior study among autistic adults suggested PERMA is best represented as one overall well-being construct (not five domains). Examining well-being may inform targets for positive psychological interventions and identify factors protective against psychopathology. However, there have only been a few studies of subjective well-being involving autistic adults.

Objectives:
The objective of this study was to identify potentially modifiable correlates of subjective well-being among a large sample of autistic adults.

**Methods:**

Participants (> 18 years of age and identified as autistic or as having autism) were recruited through Simons Powering Autism Research for Knowledge (SPARK). A custom, 68-item survey including the PERMA Profiler and questions about sociodemographics, employment, physical and mental health conditions, and health service needs, utilization and satisfaction was collected online through SPARK in August 2021. Multivariable linear regression models were fit with overall PERMA Profiler well-being as the outcome. Covariates in the final model included physical health (problems with sleep, seizures, gastrointestinal, or immune systems), mental health (presence of depression or anxiety), unmet health services need, social supports, and current employment status. Descriptive statistics were also presented on key covariates.

**Results:**

A total of 517 autistic adults completed the survey (17% response rate; M\text{age} = 39; SD\text{age} = 13; 85% White; 50% Female; 51% with a collegiate degree; 52% currently employed; 69% experiences with depression and 82% with anxiety). The mean overall well-being was 5.6 out of 10 (SD = 1.9). Among the 213 (41%) participants who reported having unmet health services needs in the past 12 months, 26% were related to general medical care, 33% specifically to mental health care, 35% to dentistry and 5% to other health services. Presence of unmet health needs had the strongest negative association with well-being, followed by having a mental health disorder, experiencing little to no social support, and increasing age (all p<0.01). Being currently employed was also strongly associated with higher overall well-being (p<0.001). Having physical health problems and experiencing higher social support (compared to “some” support) were not significantly associated with well-being.

**Conclusions:**

Subjective well-being among this sample of autistic adults recruited online was considerably lower than prior research using the PERMA Profiler. Unmet health needs, presence of mental health conditions, low social support, and lack of employment were all strong correlates of well-being. These data provide clear targets for interventions to improve well-being, which can function as a protective factor against future depression. Increasing access to mental health services (evidenced-based psychological therapies), connecting autistic adults with each other and loved ones, and providing gainful employment – all of which were directly impacted by COVID-19 – would address many of these needs.

401.039 (Poster) Examining Responses to Uncertainty and Its Role in Anxiety and Autism


**Background:**

The consensus is that Intolerance of Uncertainty (IoU) plays a significant role in anxiety in autism (Maisel et al., 2016). However, emerging evidence from qualitative studies (e.g., Lennuyeux-Comnene et al., under review) suggests that not all uncertainties are equally problematic for autistic individuals. Therefore, questions remain about what types of uncertainties induce anxiety. Studies have sought to find ecologically valid behavioural paradigms to measure intolerance of uncertainty in anxiety (e.g., Jacoby et al., 2014 and Ladouceur et al., 2000), and this study expands on this work.

**Objectives:**

Based on the existing evidence, the current study sought to examine how the manipulation of different types of uncertainty impact upon information-seeking behaviour in autistic and non-autistic adults with varying degrees of self-reported levels of anxiety and IoU.

**Methods:**

In this 16-trial experiment, 136 participants (74 autistic and 62 non-autistic) had to decide on the predominant colour of jellybeans in a jar with differing ratios (25/75, 30/70, 35/65 or 40/60) of green and red jellybeans. After that, on each trial, they rated their confidence in this decision. Only on half the trials were the participants told the ratio of green to red jellybeans, thus increasing the uncertainty about the contents of the jar on the trials when they were not. In addition, only on half the trials were the participants told that they would be given feedback on their decision at the end of the trial, thus manipulating uncertainty about the outcome of their decisions on the trials when they were not.
Two 2 (autistic vs. non-autistic group) x 2 (ratio known/unknown) x 2 (outcome known/unknown) x 4 (proportion of beans) mixed factors ANOVAs and two linear regression analyses were conducted in SPSS, with Draws to Decision (DTD) and Confidence Ratings as DVs and group, anxiety and IoU scores as IVs.

Results:

Participants requested more jellybeans as the proportion got closer to 50/50 (p < .001), particularly when the ratio was unknown (proportion x ratio interaction; p = .018). They were less confident as the proportion got closer to 50/50 (p < .001), however overall, more confident when not knowing the ratio (p=.003), particularly for the easier ratios (proportion x ratio interaction; p = .001). Overall, Autistic participants were less confident (p=.007), as were the more anxious (p = .001) and those higher in IoU (p= 008). Otherwise, there were no main effects or interactions.

In a regression model with Group, scores in anxiety and IoU as IVs, only anxiety and IoU were predictors of confidence (p=.079, p < .001, p=.012, respectively).

Conclusions:

The results indicate that in this task, autistic participants behave in a similar manner to non-autistic participants but are less confident in their decisions. The regression analysis indicates this could be because they are more anxious and more intolerant of uncertainty. Furthermore, although participants consistently respond to increasing uncertainty by seeking more information, the fact that knowing the ratio decreases confidence, indicates that they may be using different strategies to manage different types of uncertainties.

401.040 (Poster) Examining the Link between Social Connectedness and Mental Well-Being in Caregivers of Autistic Children

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Background: There is a breadth of research examining the impact of social support on the mental health and well-being of caregivers of autistic children (Gouin et al., 2016). However, no studies to date have explored the impact of social connectedness (SC) on caregivers of autistic children. SC is defined as the ability to care for and feel cared for by others while having a subjective sense of belongingness in your environment or community (O’Rourke & Sidani, 2017). Social connectedness differs from social support in that the latter is typically operationalized as the objective presence or absence of social ties, whereas the former involves more of a subjective psychological component (Ashida & Heaney, 2008). Thus, it is possible for caregivers to perceive the availability of social support yet still feel disconnected and lonely. Understanding the link between SC and the mental well-being of caregivers is important to consider when developing services and interventions to support parents of autistic children.

Objectives: The objective of this study is to examine the impact of SC on the mental well-being of parents of autistic children, while controlling for demographic variables such as income, caregiver age, and ethnicity.

Methods: Seventy-three caregivers (M_{age}=43.75, SD=7.571) of autistic children (M_{age}=11.85, SD=4.957) were recruited from advertisements through the university, community disability organizations, and health service centers. Caregivers completed the Warwick Edinburgh Mental Well-Being Scale (WEMWBS) and the Social Connectedness Scale (SCS; Lee & Robbins, 1995). First, Pearson correlation coefficients between demographic and main study variables were conducted. Second, a hierarchical multiple regression was conducted to examine the impact of caregivers’ social connectedness on their mental well-being after controlling for demographic variables. At step one, income, caregiver age, and ethnicity, were entered. At step two, social connectedness was entered.

Results: Correlational analyses showed social connectedness was positively associated with mental well-being (r(73)= .292, p = .006), and caregiver age (r(73)= .215, p = .034). A positive correlation was also found between caregiver age and income (r(72)= .214, p = .034). Step one of the hierarchical multiple regression indicated that income, caregiver age, and ethnicity accounted for 4.9% of the variance in mental well-being, resulting in a significant model (R^2 = .49, F(3, 69) = 1.194, p = .319). In step two, social connectedness was entered and accounted for an additional 8.0% of the total variance, resulting in a significant model (R^2 = .129, F(4, 68) = 2.522, p = .049).

Conclusions: The current findings highlight the important impact of SC on the mental well-being of caregivers of autistic children. Parents of autistic children experience various challenges and high caregiving responsibilities which contribute to elevated levels of stress and lower levels of well-being (Marsack & Hopp, 2019). The findings of this study demonstrate that providing targeted support which addresses parents’ sense of belonging and connectedness may mitigate some of the negative impacts that parents of autistic children experience. A limitation of the study is the relatively small sample size of seventy-three participants (Females = 71, Males = 2).

401.041 (Poster) Experiences of Autistic College Students in Higher Education and Their Relations with Faculty
Background: Autistic students are increasingly enrolling in postsecondary institutions. While studies examining faculty-student relations are rising, there are few to no studies looking at how these relations may impact academic self-concept for autistic youth.

Objectives: The purpose of this study was to investigate autistic college students’ academic self-concept and their interactions with faculty.

Methods: A sample of 12 participants was recruited for investigation regarding autistic college students’ experiences and interviewed using a semi-structured protocol. A phenomenological approach was followed, in which the goal was to understand several individuals’ common or shared experiences of relations to faculty and academic self-beliefs. Focused codes were classified into themes by relating the material to aspects about the phenomenon of interest.

Results: The interviews with students revealed that most students have a positive academic self-concept due to factors like personal motivation to do well, following family values, striving for high academic achievement, and proving someone wrong. Other factors were also found to have an impact on academic self-concept in general. These included accommodations (disclosing based on necessity, The Disabilities Services Office failing to provide necessary supports, and community colleges providing better accommodations), impact of the pandemic, and learned self-awareness. Faculty relations with students seemed to vary where each student had situations with both positive and negative interactions. The theme of accommodations was prevalent as it was found that faculty play an important role in students receiving both formal and informal accommodations needed to succeed in their courses.

Conclusions: Post-secondary institutions should consider how they can provide faculty training and professional development around supporting autistic students and managing accommodations.

401.042 (Poster) Exploring Grit and Its Associations with Psychological Well-Being in a Sample of Autistic Adults

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Background: Autistic adults experience a wide range of positive and negative life experiences. However, empirical data on individual-level protective and risk factors are sparse, limiting research and clinical practices in promoting positive outcomes in this population. Grit is a construct that has been explored in the neurotypical population to show predictability of success and psychological well-being, but has yet to be studied in autistic adults. Specifically, multiple studies have associated grit with mental health factors (e.g., depression and anxiety) and quality of life in the neurotypical population. Given the observed high rates of mental health challenges in autistic adults, the construct of grit holds the potential to elucidate possible individual processes of psychological well-being.

Objectives: To provide preliminary data on grit in an autistic adult sample by (1) exploring the structure of grit as measured by the Grit scale, and (2) examining the overall patterns of item endorsement and its associations with mental health symptoms and quality of life.

Methods: A sample of 211 autistic adults between the ages of 20-36 completed self-reported measures of the Grit scale, mental health symptom measures (Beck Depression Inventory-II [BDI-II]; Depression Anxiety Stress Scale[DASS]), and a quality of life measure (Autism Spectrum Quality of Life [ASQoL]), as part of a larger study focused on mental health and mental health services.

The Grit scale (Duckworth, 2007), a 12-item self-report scale, is currently the only measure available to assess the level of grit. Thus, exploratory factor analysis was performed on the Grit scale to explore the structure of the construct of grit in this autistic adult sample. Next, the item endorsements of the Grit scale were calculated to show patterns of discrete characteristics of grit. Lastly, Pearson’s correlation coefficients between the grit scale, mental health, and quality of life scales were generated.

Results: Results of the exploratory factor analysis indicated that a two-factor structure showed the best fit in this autistic adult sample (see Table 1 for factor loadings). The factor structure resembles the proposed two-factor structure shown in the general population study of grit (Duckworth, 2007). The average score of overall Grit is 3.09 (SD=64) in the current sample, lower than the national average of U.S. adults (Duckworth, 2007). The patterns of item endorsement showed that autistic adults were most likely to endorse that they “were hardworking/diligent” and “had overcome obstacles”, but “had difficulty focusing” or “could be distracted by new ideas”. Moreover, the total grit score showed a moderate negative correlation with depression (r=-.47 (BDI-II); r=-.49 (DASS)), a small negative correlation with anxiety (r=-.3 (DASS)); and a small positive correlation with quality of life (r=.34).

Conclusions: Our findings provided preliminary evidence that grit had two factors, as is in the general population, and showed small to moderate correlations with depression, anxiety, and quality of life. Given the high endorsement rate on specific items, next steps involve in-depth investigations at the item level to understand what grit-related qualities mean to autistic adults and how those characteristics...
influence their psychological well-being and life experiences.

**401.043 (Poster) Exploring the Lived Experience of Autistic Mental Health**

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Background: The Autism Spectrum is a lifelong, heterogenous neurodevelopmental disorder that can cause significant social, behavioural and communication challenges. Recent studies have highlighted the severity of the mental health crisis within the autistic community. While many studies have investigated the prevalence of contributing factors and the atypical presentations of specific mental health issues, such as depression, anxiety and suicidality, few studies have investigated the overall mental health of autistic adults from a lived experience perspective.

Objectives: This research investigated the lived experience of mental health of autistic adults.

Methods: Mental health factors were explored through constructivist grounded theory underpinned by a co-production framework. The principal researcher for this project was herself a member of the autistic community, as was one of the supervisors on the research team. In addition, a steering group of autistic adults informed the questions for the semi-structured interviews which were conducted with autistic adults concerning their lived experiences of mental health.

Results: Eighteen adult autistic individuals (male=7, female=11), aged between 22 and 54 years (mean=38, SD=10.6) were purposively sampled. Participants received an autism diagnosis from 15 to 52 (mean=34, SD=12.2) years of age and reported a wide variety of life experiences, with half of the participants being parents and half currently in a romantic relationship. A variety of employment and education statuses were reported including full-time, part-time, casual, self-contract and disability pension.

Preliminary findings identified that seven themes captured participants lived experience of mental health. The themes included the impact of autism diagnosis on identity, supportive relationships as a protective factor for positive mental health, sensory input as a risk factor for poor mental health, therapies need to adapt to the individual, parenting ‘a double-edged sword’, the complexities of employment and masking autistic traits.

Conclusions: Preliminary findings suggest that having supportive environments, relationships, and societal attitudes are key in protecting the mental health of autistic adults. Several of the themes identified, such as the topics of sensory input and masking, do not feature in non-autistic mental health research, suggesting these factors are unique to autistic individuals and are overlooked in current models of care and support. Findings suggest that therapies and strategies for improving mental health need to be tailor-made and targeted for the individual rather than applying a one-size-fits-all approach that is currently applied by many professionals.

**401.044 (Poster) Exploring the Lived Experiences and Health of Older Autistic Adults: Findings from a UK Research Programme on Autism in Adulthood**

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Background:

The lived experiences of older autistic adults remain poorly understood. The Adult Autism Spectrum Cohort-UK was designed to investigate the skills and needs of autistic people across the lifespan. Through ongoing programmatic research aligned with community priorities, we have sought to understand autistic people’s lived experiences, quality of life (QoL), and mental and physical health and service use, to inform the development and evaluation of novel intervention approaches.

Objectives:

From programmatic research describe: 1) the lived experiences and healthcare needs of older autistic adults; and 2) lessons learned in the development and evaluation of health interventions.

Methods:

Autistic people and relatives were recruited to the Autism Spectrum Cohort-UK study via health, voluntary sector organisations and the autism community. Over 3200 autistic adults and relatives completed a registration questionnaire about many aspects of their lives, the
Background: Adaptive functioning has been shown to be an important determinant of outcome in individuals with Autism Spectrum Disorder (ASD), determining the level of independence that an individual can achieve in adulthood. This must be one of the main therapeutic objectives when working with people with ASD and for this it is needed valid and easy tools to evaluate both, functioning of individuals and causes of failure to achieve it.

Objectives: Taking this into consideration, the first aim of the present study is to adapt the original six-factor model of the FAST to ASD population in order to create the FAST-ASD, which we hypothesize, will be more suitable for evaluating adaptive behavior in this particular population. The second objective of the study is to explore the differences in socially and clinically relevant variables between functioning groups in adults with ASD that may explain the heterogeneity of adaptive functioning in this group.

Methods: A sample of 164 adult participants with ASD from the population monitored within the ASD specialized program from a tertiary Hospital was included. The inclusion criteria were: 1) being between 18 and 65 years old; 2) diagnosis of ASD according to the diagnostic criteria of the DSM-5. The linguistic and cognitive barriers of the respondents were considered as exclusion criteria. Principal component analysis (PCA) with Varimax rotation was performed to explore the factorial structure of the FAST. Those items with loads lower than .30 were excluded and a criterion of at least 3 items per component was set. With this result, the FAST-ASD was established. A hierarchical cluster analysis was carried out using Ward's method to explore the distribution of the participants according to their responses on the instrument. Finally, a one-way ANOVA with the resulting clusters as factor was carried out to analyze differences in the subscales of the FAST-ASD instrument, as well as in clinically significant variables.

Results: The PCA found a structure of four components (Cognitive functioning, Work/Academic functioning, Independent life and Social/Community Participation), with a total of 22 items in the FAST-ASD. Cluster analysis detected four clusters based on participants' scores in the FAST-ASD. Significant differences were found between the four clusters in subscales of the FAST-ASD, with all clusters presenting difficulties in social functioning. In addition, significant differences were found between clusters in distribution by sex, age, severity of autism, intellectual functioning, and presence of psychiatric symptoms.

Conclusions: The FAST-ASD appears to be a valid instrument for the rapid assessment of adaptive functioning in the adult population with ASD. Of interest, people with ASD could be classified into different groups based on their adaptive functioning. This could be of enormous
help for the development of specific intervention programs to improve the functioning of this population. Limitations include the small number of participants, as well as the underrepresentation of adults with higher levels of support. More studies are needed to replicate the results found here in non-clinical populations with ASD.

401.046 (Poster) Facial Expressions of Emotion in Adults with ASD without Intellectual Disability: A Comparative Study to Objectify Atypicalities in the Kinetics and Accuracy of Imitation Using Automatic Facial Analysis Software

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Background:
Facial expressions of emotion (FEEs) are described as atypical in subjects with Autism Spectrum Disorder (ASD). It has recently been suggested that inadequacies of FEEs in ASD individuals in relation to expected emotion were related to a potential lower quality and coordination of facial muscle movements, especially in the eye area. However, confounding effects have been identified and could impact the interpretation of the results in many studies.

Objectives:
Our main aim was to characterize the accuracy and kinetics of the FEEs production in adults with ASD compared to healthy adults, controlling for the attention on the others’ face using eye-tracking methods and adjusting for clinical factors that could influence the production of FEEs such as gender, depressive symptoms and alexithymia. Objective automatic facial analysis methods were used in this study to assess the voluntary production of different FEEs.

Methods:
We recorded 30 adults with ASD without intellectual impairment and 30 matched controls from the French AUTICOPP study. Participants' facial expressions during imitation of standardized dynamic facial expressions of basic emotions were translated qualitatively and quantitatively using the Face Reader software which automatically analyzes facial expressions. A comparison of the production of the different emotions between the groups with and without ASD was performed using the intensity level of emotional arousal of each participant as a baseline. The recognition score of dynamic facial emotions was also assessed.

Results:
Multivariate analysis revealed that the voluntary FEEs production of adults with ASD differed from non-ASD participants regarding quality and kinetic characteristics.

Conclusions:
Facial emotion production is a complex developmental process impacted in ASD. This study provided new evidence for abnormalities in the sequence of facial muscle activation with potential spatial and kinematic chain motion dysfunctions in individuals with ASD. More specifically, asynchrony seems to be involved in the abnormal production of voluntary FEEs, contributing to deficit in social reciprocity.

401.047 (Poster) Factors Associated with a Positive Transition to an Autism-Friendly Residence Facility

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Background: A majority of autistic adults stay with their families or in residential facilities. However, residential resources are limited, and few are specifically built to meet the needs of autistic adults. Few studies systematically investigated the various facets of the individual's well-being, including quality of life (QoL), anxiety, and adaptive functioning, before and after transitioning from family home
to residential facility. Building autism-friendly residence facilities (i.e., specific architectural and clinical approaches), and identifying factors surrounding a positive transition, might support the transitioning and living experience of autistic adults into their own home.

Objectives: The aims of this study are to (1) assess the impact of transitioning to an autism-friendly residence on well-being, specifically on QoL, anxiety and their level of functioning; and (2) identify factors, as perceived by parents, associated with a positive transition to an autism-friendly home.

Methods: This is a mixed-methods (quantitative and qualitative) longitudinal study of 12 autistic adults (21-55 years; 8F:4M), all residing in the same autism-friendly residence. The majority of participants (92%) come from a family setting, and all require a mild to moderate level of support. Residents were followed for 13 months: three months before entering the residence (T1) and 10 months after their arrival (T2). Data collection combined information from (a) clinical records (e.g. IQ, associated diagnoses); (b) questionnaires completed by parents, measuring QoL (San Martin Scale - Quality of Life Assessment for People with significant disabilities), emotional and behavioral well-being (Emotional Problem Scales; EPS), and level of adaptive functioning (Adaptive Behavior Assessment System – 2nd edition), (c) semi-structured interviews with autistic adult parents before and after integration. Analyses are based on a multiple-case design series and include qualitative content thematic analyses.

Results: Objective 1. The results show that at T2, 50% of parents reported an increase in the residents' QoL and 83% noted a maintenance or an increase in adaptive functioning. Distinctly, results on the anxiety subscale of the EPS questionnaire show that 25% of residents appear to show a decrease in anxiety, 8% show an increase, while 67% remain unchanged. Objective 2. Three relevant key themes were associated with a positive transition from the family home to the new residential environment: (a) upstream preparation with the future resident helps reduce the uncertainty associated with a new living environment and increase the resident’s feeling of control over the situation; (b) staff knowledge of both challenges and strengths/interests of the resident as a lever for social participation; (c) parental involvement in the process in order to share knowledge and maintain regular contacts with their child.

Conclusions: The transition to a residence designed specifically in accordance with autistic needs seems to ease their adaptation and increase their well-being. Despite limits of this study (e.g. sample size, absence of direct input of autistic adults), these results fill a knowledge gap about the impacts of the transition from a family setting to an autism-friendly residence facility. Further analyses will aim to identify the contribution of specific architectural, clinical and lifestyle components to the current results.

401.048 (Poster) Ensuring Data Integrity Against Bots and Frauds in Online Surveys of Autistic Students

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Background: As scholars have increasingly turned their attention to autistic individuals’ postsecondary experiences, the number of studies on the topic has accelerated in recent years. However, problems with the samples for these studies severely limit their utility. Datasets on autistic college students’ experiences are often small, homogenous, and frequently exclude students who have not disclosed their diagnoses to their campus disability services office. Several scholars and self-advocates have encouraged community-engaged participatory approaches to overcoming these limitations (Fletcher-Watson et al., 2019; Nicolaidis, 2012). In one recently launched study, however, efforts to apply several principles of participatory research created one unanticipated challenge that required quick and comprehensive countermeasures: data contamination by automated bots and fraudulent responses.

Objectives: To help other researchers avoid potential complications in their own work, this presentation draws from an ongoing study to offer explicit guidance for how to protect the integrity of data collected through online surveys. Specifically, we will outline the 13-step process we developed to assess data quality, confirm the authenticity of respondents, and ensure we don’t waste thousands of dollars compensating robots, scammers, and cheats.

Methods:

When seeking autistic college students to participate in an online survey, we partnered with autism and disability-centered organizations to spread the word to their thousands of followers on social media and via email list-servs. We also sent targeted emails to autism and higher education researchers, directors of autism-specific college support programs, autistic self-advocates, and disability practitioners who furthered distribution through personal outreach or social media. Our project team also held information sessions in a webinar and at a conference, shared it on our social media, and emailed personal contacts. Eligible participants would receive $25 gift cards as compensation for their time. We anticipated receiving no more than 200-250 survey respondents spread out over 3 months of data collection.

To our surprise, a total of 1,122 responses were recorded within just 4 days of the survey’s launch. Our review of those responses, however, made it clear that more than 90% of responses were fraudulent, duplicates, or completed by automated bots. Over the subsequent week, we
implemented a series of digital countermeasures that dramatically reduced these types of responses. We have subsequently developed a 13-step manual process that helps us identify and remove any fraudulent responses that made it past our digital defenses.

**Results:** Although many online survey platforms offer response validation and bot-detection tools, we have found those integrated tools to be woefully inadequate. With our project, the software flagged fewer than 5% of what we subsequently determined to be a fraudulent response. Far more effective were a set of researcher-defined filters targeting study-specific indicators of likely fraud (e.g., reverse-coded items with nonsensical responses) followed by a multi-step manual data verification process.

**Conclusions:** By leveraging recent advances in technology maximizing engagement with the autism community, researchers are increasingly able to recruit from larger and more diverse pools of potential participants. But doing so effectively will require implementation of comprehensive protections against fraudulent responses.

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**401.049 (Poster) Genetic Testing History in Adults with Autism Spectrum Disorder**

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**Background:**

Many genes have been identified in autism spectrum disorder (ASD; Vorstman et al, 2017). For clinicians, the genetic cause provides critical information about prognosis and associated medical problems. For adults with ASD, the genetic cause informs care and facilitates connection to support groups for specific genetic conditions. For researchers, the genetic cause aids mechanistic and novel therapeutic studies. Despite the availability of genetic testing and utility to multiple stakeholders, little is known about how many adults with ASD receive recommended genetic testing and their outcomes.

**Objectives:**

Estimate (1) the percentage of adults with ASD who have received genetic testing among those represented by our ASD specialty clinic patients; (2) associations of demographic and clinical characteristics with receiving recommended testing; (3) the percentage with positive findings and findings of unknown significance among those receiving recommended testing.

**Methods:**

Adults were identified and ASD diagnoses confirmed using record review by consensus of psychiatrists specializing in ASD, as previously described (Thom et al., 2022), but with no exclusions based on genetic conditions. Electronic medical records were manually reviewed and clinical and genetic history data recorded. Patients were included (N=630) who had at least one visit with a qualifying clinician from our hospital between 5/1/2010 and 12/15/2020 and had demographic data available. Risk regression quantified associations of characteristics of adults with recommended testing.

**Results:**

Only 41% of the adults with ASD (261/630) had a history of genetic testing documented in the medical record. Genetic testing was declined by the patient or family for 11% (72) of records and not recorded in 47% (297). Mean (SD; range) age for the 261 adults with testing documented was 28.5 (5.3; 22-58) years. Sixty-seven (26%) were identified as female, 14 (6%) as Asian, 8 (3%) as Black or African American, 226 (89%) as White, 6 (2%) as other race, and 2 (1%) as Hispanic. 189 (73%) had intellectual disability. Ninety-one percent (236) had the genetic testing method recorded. Figure 1 displays percentages with different testing methods. Only 54% (95% CI: 47%, 60%) of patients had testing using a recommended method (chromosomal array, autism/intellectual disability sequencing panel, or exome sequencing). Few adults had received testing with sequencing technologies. Presence of microcephaly, macrocephaly, or dysmorphic facial features was associated with 1.57 (1.14, 2.16) times the frequency of recommended testing after adjustment for age, sex, and seizure history (p=0.005). Age, sex, intellectual disability, family history of ASD, and seizure history were not significantly associated. Outcomes of genetic testing by method are presented in Table 1.

**Conclusions:**

Current genetic testing can offer clinical and research insights. Yet it is underutilized in this population of adults with ASD. Nearly half of the adults in our sample lacked documentation of recommended genetic testing. Thus, the percentage of adults with confirmed ASD who had any recommended genetic testing may be even lower than reported. Many adults with ASD may benefit from having their genetic
testing history reviewed in the clinic and the latest genetic testing performed.

401.050 (Poster) Group Interpersonal Synchrony Effectiveness for Young Autistic Adults in a Pre-Military Training Program – Preliminary Results

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Background: The prevalence of cognitively-abled autistic adults that successfully integrate into the world of work is limited due to difficulties in adapting to social and stressful work environments. The global transition to a hybrid work approach might increase these difficulties by promoting distance socializing. Therefore, there is a growing interest in forming tailored interventions that will enhance prosociality and reduce work-related stress among this group of individuals. Interpersonal synchrony is observed when two or more individuals are sharing body movements or sensations (such as gaze, affect, voice and touch) simultaneously or as a responsive behavior, and is a powerful force in holding human groups together.

Objectives: This preliminary study aims to assess the effect of group interpersonal synchrony on prosociality and work-related stress of young adults who participate in an innovative Israeli program “Roim Rachok” (Looking Ahead). Roim Rachok designed to integrate cognitively-abled autistic adults first into the Israeli army workforce, and later into the free market.

Methods: The study is a between-subjects randomized controlled trial, which investigates two conditions of movement-based group intervention: synchronous (N=21) and non-synchronous (N=24), providing each participant with only one type of intervention. The participants, 45 young adults between the age of 18- to 21 years, are diagnosed with autism and recently joined the “Roim Rachok” program. The two condition groups were matched by gender, handedness, army-related profession and belongingness. Hour-long intervention sessions were performed by the researcher, a professional Dance Movement therapist, once a week for the duration of seven weeks, using two protocols designed specifically for the program. The protocols differed in terms of using synchronous movement activity forms vs. using non-synchronous movement activity forms. They did not differ in terms of movement type and duration to control for their effect on the study’s dependent variables. Each intervention group contained between 7- to 10 participants (three groups for each condition). Data collection using questionnaires and behavioral tasks was conducted for each participant during two points of time: pre and post intervention period. The effect of the intervention over time was examined using a two-way mixed model ANOVA.

Results: No significant difference was found between intervention groups in terms of improvement in prosociality and reduction in work-related stress. Participants in the synchronous group had more close friends within the group before the intervention but fewer close friends within the group after the intervention, compared to participants in the non-synchronous group. After the intervention, participants in the non-synchronous group felt closer to their peers and had a higher sense of belonging to the group, compared to participants in the synchronous group.

Conclusions: The preliminary results are inconsistent with findings among neurotypicals. We discuss the need to control for the number of perceived close friends within the group before the intervention since it might influence the outcomes. A mixed methods approach might enable an in-depth understanding of the quantitative results by incorporating the participants’ qualitative perspectives.

401.051 (Poster) Growing up with Autism: Perspectives from Emergent Adults with Autism on Quality of Life and Its Relation to Everyday Functioning

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Background:

Adults with autism seem to have a poorer Quality of Life (QoL) throughout their lifespan when compared to neurotypical adults, and when measured with instruments designed for the general population. However, there is no agreement on what constitutes a good QoL for people with autism. QoL may be perceived as something different for people with autism than for people in the general population, and hence traditional measures of QoL may not sufficiently tap into what QoL means for people with autism.

Objectives:

Given that oral, qualitative descriptions can capture richer, subjective experiences than questionnaire-based measures, we sought to understand how emerging adults with autism experience, describe and reflect on what constitutes a good Quality of Life from their own perspective. We examined particularly how perceived quality of life relates to participants’ everyday functioning.
Methods:

Participants were recruited from the Lillehammer Neurodevelopmental 10-year follow-up study (LINEUP) in Norway. Fourteen emerging adults with autism (3 female, 11 male) agreed to take part of in-depth, semi-structured interviews. They ranged in age from 21-29 years. The majority were students, some were employed part or full time, and a few did not have any organised daily activity. Most participants lived independently. We asked probing questions about their perceived Quality of Life and how they set out to achieve it.

We followed Braun and Clarke’s method for reflexive thematic analysis using an inductive (bottom-up) approach to identify patterned meanings within the dataset. The reflexiveness in thematic analysis brings in the awareness that we, as researchers, must be aware of our pre-existing assumptions, as we bring them to bear on the interpretation of the findings.

Conclusions:

Initial analysis suggests that, despite often-substantial challenging experiences during childhood and adolescence, the majority of our interviewees described having meaningful lives in emerging adulthood, particularly centered around participating in activities that captured their interests. Ongoing mismatches in communication between emerging adults with autism and professionals are one key barrier to achieving a good quality of life. Future research should seek to address this barrier for autistic adults at this particular stage of life.

401.052 (Poster) How Are Social-Emotional, Educational, and Vocational Outcomes Related to Structural Language in Autism Spectrum Disorder and Loss of Autism Diagnosis?


Background: Long-term outcomes in autism spectrum disorder (ASD) are heterogeneous, including individuals diagnosed with ASD in childhood who no longer meet criteria for ASD in adolescence or adulthood, referred to as “loss of autism diagnosis” (LAD; Charman et al., 2005; Fein et al, 2013; Pickles et al., 2020; Zachor & Ben-Itzhak, 2020). The current study examines associations between heterogeneity in structural language and long-term outcomes in ASD and LAD.

Objectives: Our pre-registered (https://osf.io/tzvpq) research questions (RQ) were: 1) How do social-emotional, educational, and occupational outcomes in adolescence and adulthood differ in ASD and LAD versus NT peers? 2) To what extent is structural language associated with outcomes in ASD and LAD versus NT peers?

Methods: Participants were adolescents and young adults with ASD (n = 24), LAD (n = 31), or NT (n = 32; Table 1). Social-emotional, educational, and vocational outcomes were measured using the Achenbach System of Empirically Based Assessment (ASEBA), Vineland Adaptive Behavior Scales 3rd edition, and online surveys (RQ1). Structural language was measured with the Clinical Evaluation of Language Fundamentals 5th edition, a grammaticality judgment task (structural language processing), and via parent report of early language milestones (age of first words/phrases; RQ2).

Results: Descriptive results (Table 1) indicate group differences in Socialization and Daily Living Skills. The ASD group had the lowest scores, the LAD group had intermediate scores, and the NT group had the highest scores (p’s < .05). Young adults with ASD had significantly higher ASEBA Total Problems scores relative to the LAD (p < .01) and NT (p < .01) groups, who did not differ significantly (p = .88). This evidence suggests greater challenges in social and adaptive functioning in ASD than in LAD or NT. Structural language skills were associated with ASEBA Anxiety/Depression for adolescents with ASD (p’s < .05; e.g., Figure 1), but not LAD or NT. The same was true for history of early language delay. This finding indicates that relatively better structural language and no history of early language delay were associated with relatively less anxiety and depression symptomology in ASD. Better structural language skills was also associated with lower ASEBA Withdrawn and Total Problems scores across ASD and LAD adolescents (p’s < .05). On-time language milestones was associated with full time student or employment status versus less than full time status across ASD and LAD young adults (p’s < .05), and with fewer supports in college courses for LAD young adults (p < .05). Relatively better structural language processing was associated with more working hours and fewer supports at work across ASD and LAD young adults (p’s < .05).
Conclusions: Findings suggest that current structural language skills and early language development have implications for long-term social-emotional, educational, and vocational outcome. Relatively better language skills may represent a protective factor in psychopathology symptoms and in participation in educational and vocational systems in ASD to a greater degree than in individuals with LAD and in NT peers.

401.053 (Poster) Strengths, Functioning and Support Needs from the Perspective of Autistic Adults in Australia
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Background:
An assessment of functioning is increasingly required for autism diagnosis, funding eligibility and support planning. According to the Australian guideline for autism assessment and diagnosis, a comprehensive assessment of functioning should identify activity and character strengths, functioning as defined in the International Classification of Functioning, Disability and Health (ICF), current supports and unmet needs.

Objectives: This study aimed to explore the self-reported strengths, functioning and support needs of Australian autistic adults.

Methods: Data collection was via an online cross-sectional survey that included fixed-response questions designed for this study (including a comprehensive ICF Core Sets for Autism measure) and a series of standardized measures. These included the Global Assessment of Character Strengths (GACS-24), World Health Organization Disability Assessment Schedule (WHODAS 2.0), and Craig Hospital Inventory of Environmental Factors (CHIEF). Data were analysed using descriptive statistics.

Results:
Thirty autistic adults provided data about their strengths, functioning and/or support needs. They ranged from 18 to 55 years old (median = 40), were predominantly female (n=23, with 4 males and 3 not identifying with either gender label) and did not report any cultural or linguistic diversity.

Strengths – Results from the ICF Core Sets for Autism measure showed the most frequently reported activity strengths were related to Learning and Applying Knowledge (followed by Major Life Areas and Mobility) and the strongest environmental resources were related to Products and Technology (followed by Support and Relationships and Services, Systems and Policies). According to the GACS-24, the highest character strengths were Fairness, Honesty and Love of Learning, and the most endorsed virtue was Wisdom.

Functioning – Results from the ICF Core Sets for Autism measure showed the most frequently reported impairments were associated with Mental Functions, activity limitations with General Tasks and Demands and participation restrictions with Interpersonal Interactions and Relationships. Based on the WHO-DAS 2.0, they experienced greater activity limitations and participation restrictions than more than 90% of the population, particularly with Getting Along with People and Life Activities. The ICF Core Sets for Autism measure scores suggest the greatest environmental barriers were in relation to Natural Environment and Human-Made Changes to Environment (followed by Attitudes and Services, Systems and Policies). According to the CHIEF, overall, they experienced mild to moderate environmental barriers across domains.

Support Needs – In response to questions designed for this study, the autistic adults provided information about 70 support needs (median = 4 per person). These were most frequently categorized as needing assistance with Social, Economic and Community Participation and Capacity Building. Of those who selected ‘other’, additional categories included support from family members, public mental health services and healthcare funding. Nearly one-third of the support needs were classified as high and over half of the support needs were...
described as moderate. On a sliding satisfaction scale (where 0% = not at all satisfied and 100% = completely satisfied), median satisfaction with current supports was 60%.

Conclusions: These results highlight a complex interplay between strengths, functioning and support needs that need to be considered during assessment, diagnosis and support planning.

401.054 (Poster) How Autistic Students Define Success: Getting Beyond Grades and Graduation
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Background: Much of the published research about college students with autism operates from an implicit deficit perspective, often describing these students as having poor postsecondary outcomes, particularly when compared to other student populations using traditional indicators of college achievement like GPA (e.g., McLeod et al., 2019) or degree completion (e.g., Newman et al., 2011). Many autistic students, however, have much broader definitions of college success. For example, autistic students have emphasized the desire for college to help them feel “like part of a community” and develop “the tools necessary to prepare for the workplace” (Autistic Self-Advocacy Network, 2020), outcomes which are largely overlooked by the empirical literature to date.

Objectives: Using data provided by autistic students themselves, our participatory research project is working to develop alternate definitions of college success for autistic students and identify key factors affecting these students’ ability to thrive while in college.

Methods: Our multi-institutional sample of US undergraduates is being recruited through partnerships with 1) postsecondary institutions hosting autism-specific support programs; 2) autism advocacy organizations; and 3) individual autistic self-advocates and allies, all of whom are working to maximize the participation of women and gender non-binary, racially minoritized, LGBTQ+, and community college students.

Data are collected using a survey instrument developed by a team of multidisciplinary scholars and practitioners, in consultation with an advisory board of autistic self-advocates, addressing five domains of autistic students’ lives: personal, social, psychological, academic, and professional. Participants articulate their personal definitions of college success through open-ended narratives and responses to a series of Likert-scale questions about the relative importance of 20 potential college outcomes. Analyses include group comparisons (e.g., t-tests, ANOVA), structural equation modeling (ESEM), and multi-level modeling (HLM). Results described in this abstract are drawn from basic descriptive analyses of early respondents. Data collection will continue throughout Fall 2022 and is expected to yield 175-225 students for the final analytic sample.

Results: More than 90% of respondents indicated that “having good mental health” was “somewhat” or “very” important to their definition college success. More than 80% endorsed the importance of getting a job in their area of interest and that allows them to be financially independent. Similar numbers highlighted the importance of being “comfortable with their identity as autistic” and “being part of a community of people like them.” In contrast, fewer than half of the students indicated that having a romantic relationship or joining a student organization was important. Overall, students ranked graduation as only the 6th most important indicator of success; getting good grades was tied for 12th on the list. As one student summarized, success means “to learn and achieve one’s intellectual goals without sacrificing health and happiness.”

Conclusions: While in college, autistic students’ highest priorities relate to maintaining mental health, getting a good job, and embracing their autistic identity individually and as part of a community. Therefore, we encourage researchers, practitioners, and policy makers to embrace a more holistic definition of college success that incorporates these goals alongside traditional measures like grades and graduation.

401.055 (Poster) I Am a Part of Something Bigger Than Me: Supporting and Measuring Authentic Autistic Engagement in a Multi-Site Comparative Effectiveness Trial for Suicide Prevention

Background: Autistic people have long supported authentic engagement in research through campaigns such as “Nothing about us without us.” However, few randomized controlled trials in autism research involve autistic people as study team members. Further, many studies involving autistic people do so in tokenistic ways. Major research funders have begun to recognize that research requires a paradigm shift towards authentic and meaningful involvement of autistic people in research. However, limited information exists about the use and impact of specific engagement approaches.
Objectives: This presentation describes preliminary engagement approaches and outcomes from Y1 of a 5-year multi-site comparative effectiveness research study on suicide prevention. This study includes autistic people in all aspects of the project, including study design, outcome measure selection and revision, clinician training program development, delivering the training, and data collection and analysis.

Methods: The RE-AIM framework was used to contextualize program evaluation of engagement approaches. Reach was quantified by representation of autistic people on study teams and rates of participation in study team meetings. Effectiveness was quantified by anonymous ratings of engagement by autistic and other collaborators on the psychometrically sound “Stakeholder-Centric Engagement Evaluation” (SCEE; Martinez et al., 2021). Adoption refers to autistic participation in decision-making via a co-developed process, and adoption by Principal Investigators (PI) of autistic input. Implementation refers to study staff reports of use of engagement strategies in the broader study context outside of the engagement team (not able to be measured in Y1), and Maintenance refers to long-term use of engagement skills by the research team (not able to be measured in Y1).

Results: Presentation of specific engagement approaches will be described, including the development of a Governance Document, decision-making process, and evaluation metrics in collaboration with our autistic members. Within the broad study team, 18 autistic people or care partners of autistic people are represented in 4 of 7 main core teams (Leadership; Training & Implementation; Stakeholder Engagement; Dissemination). Participation rates by autistic people in the Leadership meetings were >99%, Training & Implementation team meetings was >90%, and in Stakeholder Engagement team meetings was 91%. No Dissemination meetings have been scheduled so engagement has not yet occurred. Engagement ratings on the 23-item SCCE were positive overall (average of >4.5 on a scale of 1-5 on all but two items). Areas of improvement rated lower than average included “Streamline study communication” (M=4.29, range=2.5-5.0) and “Use multiple methods of communication for autistic partners to give input that fits communication preferences/needs” (M=4.40, range 2.0-5.0). Our decision-making process was felt to be useful, and autistic people felt comfortable using this process to disagree with proposed decisions, which ultimately resulted in PIs adoption of revision of outcome assessments, consent forms, and methods for sharing study outcomes.

Conclusions: Other research teams will benefit from the explicit guidance and recommendations learned from this study for supporting meaningful and authentic engagement of autistic research partners. Engagement can be measured, and the use of process and procedure documents was helpful for defining principles of engagement important to autistic partners.

401.056 (Poster) Identifying Work System Barriers and Facilitators to Quality Healthcare for Middle Aged and Older Autistic Adults


Background: Better understanding how the healthcare environment can best serve the needs of autistic adults is necessary in order to identify how to best support autistic adults’ health and healthcare access as they age. The Systems Engineering Initiative for Patient Safety (SEIPS) model of work system and patient safety provides a framework for understanding structures, processes, and outcomes and their relationships within healthcare environments. The SEIPS model depicts how specific work system structures (person, tasks, technology and tools, environment, and organization) interact to impact processes and outcomes and emphasizes the role of feedback from processes and outcomes to inform work system re-design. This model is particularly useful in providing a framework for identifying relevant elements within the healthcare work system that can be adapted to improve processes and outcomes.

Objectives: To use the SEIPS model to identify and describe work system characteristics that middle aged and older autistic adults specified as important barriers or facilitators to receiving quality healthcare.

Methods: We conducted a series of one-on-one interviews with middle aged and older autistic adults (N=15). Autistic adults were eligible to participate if they: (1) were age 35+; (2) had an administrative, professional, or suspected diagnosis of autism spectrum disorder; and (3) were able to communicate in English. Our second round of recruitment targeted adults who identify as BIPOC (Black, Indigenous, and people of color) and/or as transgender or nonbinary. Semi-structured interviews probed experiences with health and healthcare across four domains: (1) health habits; (2) health problems; (3) health services; and (4) autism and aging impact. Data were transcribed and analyzed using conventional content analysis. Transcripts were analyzed consecutively. Themes were identified in the text and aligned with components of the SEIPS model (person, organization, tasks, tools/technology, environment, care processes, and patient outcomes).

Results: Several themes that aligned with components of the SEIPS model were identified and repeated across the interviews with the autistic adults. Within the organization component for instance, barriers and facilitators that impacted their receipt of care included having informal and formal support, the length and strength of their relationships with healthcare providers, doctors' understanding and experience with autistic adults, as well as state and national healthcare policies and regulations. Many autistic adults noted that lights, noises, smells, and accessibility and layout of healthcare spaces impacted whether they would engage in work system tasks like visiting a healthcare provider when something is bothering them or accessing preventive care. Participants identified personal challenges, including sensory differences and executive functioning challenges that impacted their ability to communicate and advocate for their healthcare needs.

Conclusions: Through the SEIPS model of work system and patient safety, we described the interactions between middle aged and older autistic adults and their healthcare systems in order to identify points for improvement and intervention. Our model suggests that in order to
improve healthcare outcomes, interventions must target both personal factors such as challenges with executive functioning as well as organizational and environmental factors, such as doctors' training in autism or the physical accessibility of healthcare spaces.

401.057 (Poster) Impact of Executive Functioning and Enjoyment on Higher Education Success for Neurodivergent Students
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Background:

More neurodivergent students are enrolling in higher education, but completion rates are reported as lower than neurotypical students. Most research focuses on autistic students attending university, however, other neurodivergent conditions (i.e., attention deficit/hyperactivity disorder, specific learning disorders, communication, tic, and developmental coordination disorders) remain understudied. Success in higher education has been linked to executive functioning (EF), mental health conditions and enjoyment for neurotypical students. EF has been found to affect academic success in autistic students, but it has not been investigated in other neurodivergent conditions. Understanding which factors affect success may enable more tailored supports for neurodivergent students, thus increasing retention and completion rates.

Objectives:

The aim of this study was to determine which factors contribute to higher education success for neurodivergent students, and whether this differed to neurotypical students.

Methods:

Neurodivergent ($n=131$, $M_{age}=31.34$) and Neurotypical ($n=73$, $M_{age}=33.16$) Australasian higher-education students (18-60 years, 70.4% female) completed an anonymous online survey, which captured diagnosis, enjoyment of higher-education experience, use of supports, academic success (defined as units completed in the previous term or semester: none, some or all), autistic traits (SRS2), ADHD traits (ASRSv1.1), executive functioning (EFI), self-efficacy (NSES), sensory sensitivities (GSQ), anxiety (GAD7), depression (PHQ9), wellbeing (WEMWBS), and social support (SSQ). Excluding missing data, the final sample for the following analyses included 89 Neurodivergent ($M_{age}=31.29$, 78.7% female) and 50 Neurotypical ($M_{age}=34.36$, 73.5% female) students. The study was designed with and informed by paid neurodivergent and lived experience advisors.

Results:

ANOVA, Kruskal-Wallis, Chi-square, and Fisher’s Exact analyses were used to identify significant potential predictors of success. EF and enjoying HE were significantly associated with success for neurodivergent students, while EF, sex-at-birth and accessing supports in HE were significantly associated with success for neurotypical students. For neurodivergent students, ordinal regressions showed that HE enjoyment was a significant predictor of success ($p = .008$) with an odds ratio of 4.13. An increase in EFI scores was also associated with an increase in success ($p = .004$), with an odds ratio of 1.08. For neurotypical students, EFI scores was the only significant unique predictor. Ordinal regressions showed that an increase in EFI scores was associated with an increase in success ($p = .033$), with an odds ratio of 1.10.

Conclusions:

The factors contributing to success in higher education differed for neurodivergent and neurotypical students. For neurodivergent students, enjoying the overall higher-education experience increased the odds of completing more units of study. Regardless of neurotype, higher executive functioning skills were associated with increased odds of completing more units. These results indicate that supports to improve executive functioning skills may be worthwhile for all higher education students. Additionally, for neurodivergent students, tailoring efforts to increase enjoyment of the higher-education experience may improve retention and completion rates.

401.058 (Poster) Impact of the COVID-19 Pandemic on Autistic Adults: A Scoping Review
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Background: The COVID-19 pandemic and its associated restrictions have had a significant impact on people’s everyday lives, including the lives of Autistic adults. The pandemic may have had a negative effect on Autistic adults in particular (Pellicano & Stears, 2020), as this
group is at greater risk of experiencing mental health problems (Lai et al., 2019) and may depend significantly on (in)formal support from others.

Objectives: We aimed to a) synthesise all papers currently published on the impact of the COVID-19 pandemic on Autistic adults, and b) identify lessons for the care and support of Autistic adults in pandemic and post-pandemic times.

Methods: We searched for relevant empirical quantitative and qualitative studies in electronic databases (e.g., Pubmed) and autism-related journals using pre-specified search terms. During an initial search in May 2022, we identified 747 abstracts of which 105 were selected for a full paper read (98% inter-rater agreement). Of these 105 papers, 47 papers were found eligible (94% inter-rater agreement). During a second search in August 2022, we identified an additional eight eligible papers, yielding a final list of 55 studies (see Figure 1). We assessed the quality of studies using the Mixed Methods Appraisal Tool (MMAT; Hong et al., 2018).

Results: The 55 eligible papers were categorized as follows: 1) direct effects of the COVID-19 virus on Autistic adults including infection risk, hospitalisation, death, and vaccination rates (n=10); 2) effects of COVID-19 restrictive measures on care, support and services for Autistic adults (n=11); 3) COVID-19-related effects on the wellbeing of Autistic adults (n=32); and 4) other (n=2). Most studies took place in the US (n=13; 24%) and the UK (n=12; 22%), and most (n=34; 62%) collected data at least partly in the earliest phase (March-May 2020) of the pandemic. Many studies had a relatively poor methodological quality.

Together, the studies suggest that Autistic adults are likely to have been disproportionately impacted by the COVID-19 pandemic in several ways: (1) they were at increased risk of contracting COVID-19 and experiencing serious health threats as a result; (2) they often struggled to access critical services and supports as a result of stay-at-home restrictions; and (3) despite some positive uplift due to reduced external pressures to adapt to ‘neurotypical’ norms, many experienced challenges to their mental health – particularly those with pre-existing mental health issues and limited social support.

Conclusions: Study findings are consistent with the pandemic’s detrimental effects on disabled people more broadly, also referred to as the “triple jeopardy” (Shakespeare et al., 2021). Moreover, our review likely underestimates the negative impact of COVID-19 on Autistic adults, since most reviewed studies focused on speaking Autistic adults in high-income countries. Few studies reported actively including Autistic adults or their allies in the research process. Actively involving the Autistic community in research will ensure that future research, clinical services and care are aligned with the needs and priorities of Autistic people.

401.059 (Poster) Measurement of Emotion Reactivity and Emotion Regulation in Autistic Adults: A Systematic Review
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Background:
Emotion reactivity and regulation underlie the psychopathological processes experienced by autistic adults (AA) but there is limited research in how emotion reactivity and regulation are described in AA. Weiss et al. (2014) reviewed emotion regulation in autistic youth and identified a variety of physiological measures used but did not focus on adults. Additionally, no systematic review has been conducted in emotion reactivity in AA. Given the methodological heterogeneity, a systematic review of the extant literature of emotion reactivity and regulation in AA is warranted.

Objectives:
We conducted a systematic review of studies that examined emotion reactivity and regulation in AA and reported findings across four levels of analysis according to the NIH research domain criteria to depict current understanding and directions for future research.

Methods:
The existing literature was systematically searched for peer-reviewed publications that measured emotion reactivity and/or regulation in a sample of AA up to March2022 (Figure1). Reactivity refers to the frequency/intensity/duration of an emotional response and regulation as the modification or maintenance of an emotional response.

Results:
Across the 24 included studies, 16 examined only reactivity, six examined only regulation, and two examined both reactivity and regulation. The 18 studies that measured reactivity, physiology was the most common level of analysis (Table 1); however, there was a variety of seven different physiological methodologies represented with skin conductance response as the most used method. Examination of circuitry of reactivity almost always consisted of fMRI techniques to measure activation in the frontal, occipital, and temporal lobes and
Amygdala. Of the eight studies of regulation, seven relied on self-report questionnaires and one study solely examined the patterns of brain activation and pupillometry (Table 1). Reactivity to negative emotion was studied more often than positive emotion and consisted of more specific negative emotions (fear/threat, anger, sad, aggressive, explicit, unpleasant) whereas studies that looked at positive emotion were limited to depictions of happy, pleasant, or positive. For the studies that utilized a laboratory paradigm to measure reactivity and regulation, the most common set of emotional stimuli used, mostly of facial expressions, were from the NimStim database compared to the other reported databases (Pictures of Facial Affect, Karolinska Emotional Faces, IAPS). The most commonly used self-report measure for reactivity was the Self-Assessment Manikin (Bradley & Lang, 1994) and for regulation was the Emotion Regulation Questionnaire (Gross & John, 2003). Behavior was measured rarely in reactivity and not at all in studies of regulation.

Conclusions:

AA demonstrated differences in reactivity at the circuitry and physiological levels when compared to non-AA but their differences do not represent a consistent pattern of deficits given the variety of different emotional paradigms used. For regulation, AA reported using more maladaptive strategies compared to non-AA, but these effects were not examined thoroughly at the other levels of analysis. Study design heterogeneity limits ability to infer how emotion reactivity and regulation are described in AA. Considerations for future studies include establishing standard methodological procedures across multiple levels of analysis (especially for emotion regulation) and exploring negative and positive emotions together.

401.060 (Poster) Internalized Stigma Moderates the Relations between Social Camouflaging and Self-Reported Anxiety and Depression in Autistic Adults

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Background: Autistic adults are at an elevated risk for experiencing mental health difficulties and social exclusion (Mitchell et al., 2021). Autism is a stigmatized social identity and internalizing this stigma has been demonstrated to negatively impact autistic adults’ mental health (Han et al., 2022). One response to this internalized stigma and its associated consequences is concealing one’s autistic traits, termed social camouflaging. Applying Social Identity Theory, social camouflaging may act as an individualistic strategy to alleviate the negative effects of stigma through allowing individuals to distance themselves from their social identity (Tajfel & Turner, 2004). However, previous research has established that social camouflaging may also negatively impact autistic adults’ mental health (Bradley et al., 2021). Therefore, further examining how internalized stigma and social camouflaging together are related to the mental health of autistic adults is of interest.

Objectives: Examine relations between internalized stigma, social camouflaging, and mental health in autistic adults.

Methods: 60 autistic adults (8 male, 33 female, 19 nonbinary/two-spirit/Agender/gender-diverse) ages 18 to 67 (M=36.10, SD=11.46) participated in this study online. Participants completed the Autism Spectrum Quotient (AQ) as a measure of autistic traits, the Internalized Stigma of Mental Illness (ISM-10) as a measure of internalized stigma, and the Camouflaging Autistic Traits Questionnaire (CAT-Q) as a measure of social camouflaging. Additionally, three measures of mental health were completed, the Anxiety Scale for Autism-Adults (ASA-A), the depression subscale of the Depression, Anxiety and Stress Scale (DASS-21), and the Suicide Behaviours Questionnaire-Revised (SBQ-R).

Results: To examine relations between internalized stigma, social camouflaging, and mental health, separate hierarchical regression analyses were conducted for each mental health measure. Participants’ AQ scores, gender, and age were controlled in Block 1, centered internalized stigma and social camouflaging scores were entered in Block 2, and a two-way interaction term between internalized stigma and social camouflaging was entered in Block 3. Internalized stigma and social camouflaging accounted for 38% of the variance in anxiety (F(2,54)=20.13, p<.001), 10% of the variance in depression (F(2,54)=3.56, p=.035), and an insignificant portion of variance in suicidal behaviour (F(2,54)=2.23, p=.117). The interaction term accounted for 14% of the variance in anxiety (F(1,53)=20.41, p<.001) and 5% of the variance in depression (F(1,53)=4.02, p=.050), such that social camouflaging was positively associated with anxiety and depression only for participants with no-to-mild internalized stigma, and not for participants with moderate-to-severe internalized stigma.

Conclusions: Internalized stigma and social camouflaging were found to be significant predictors of anxiety and depression, but not suicidal behaviours. Relations between social camouflaging and both anxiety and depression varied by severity of internalized stigma. These results may suggest that social camouflaging does not negatively impact the mental health of autistic adults with more severe internalized stigma; however, camouflaging may be distressing for those who hold a less stigmatized view of their autistic identity. A limitation to the generalizability of these findings is that females were overrepresented in the sample. Better understanding relations between internalized stigma, social camouflaging, and mental health is important as autistic adults commonly experience social exclusion and mental health issues.

Background: Autism has long been viewed as a paediatric condition, resulting in a ‘lost generation’ of autistic adults who were not diagnosed as children. Diagnosis is a critical element on the pathway to good healthcare for autistic people. Community prevalence surveys in the UK and Sweden suggest that the true rate of autism has been stable for the past 70 – 80 years, implying that recent higher rates of diagnoses in younger people reflect better autism awareness/ access to assessments.

Objectives: We aimed to estimate numbers of diagnosed and undiagnosed autistic people in the UK, and explore age-related inequalities in access to diagnostic assessments. We did this by comparing the prevalence of diagnosed autism within the database across different age groups to estimates of community prevalence, derived from published surveys and also from the rate of diagnosed autism in the database for children and young people, who have had better access to diagnostic assessments compared to older generations. We also examined how diagnostic rates in the UK differed in relation to socio-demographic factors between 2000 and 2018.

Methods: This was a population-based cohort study of prospectively-collected UK primary care data from the IQVIA medical research database. 1,840,036 individuals registered at a primary care practice in 2018 and 8,292,873 individuals registered between 2000 and 2018 were included.

Results: As of 2018, 0.74% of people in the database were diagnosed autistic: 1.15% of males and 0.33% of females. Diagnostic rates were higher in children/young people vs. adults and older adults: 2.84% of 10- to14-year-olds were diagnosed (1 in 35), vs. 0.02% aged 70+ years (1 in 5,000). As of 2018, an estimated 526,700 people (0.79% of the UK population) were diagnosed autistic, and an estimated
Conclusions: Major age-related inequalities in autism diagnoses persist in the UK. Even conservative estimates of true autism prevalence suggest that at least nine out of 10 autistic people aged 50+ in the UK are undiagnosed. A step-change in access to diagnostic services is needed to reduce health inequalities experienced by autistic adults due to underdiagnosis.

401.063 (Poster) Language and Intellectual Ability Profiles in Autistic Adults: A Clinical Database Study
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Background: The ICD-11 classification for autism proposes five codes for application of specifiers for Co-occurring "Disorder of Intellectual Development" (DID) and "Degree of Functional Language Impairment" (LI): four categories resulting from crossing these two specifiers and a fifth category for individuals with no/almost no functional language, who also have DID (WHO, 2022). While characterization of these categories has been documented for children (Silleresi et al., 2020), little research has been devoted to investigation of language and intellectual ability profiles in adults (Bradshaw et al., 2020). The robustness of this classification for adults remains an open question. This question deserves study as part of efforts to document adult autism profiles, but also because there is evidence for significant language "catch-up" in autism (Magiati et al., 2014; Howlin et al., 2014), and that LI, with or without ASD, may contribute to lowered nonverbal intelligence quotients (NVIQ) over time (Gallinat & Spaulding, 2014; Botting, 2005; Conti-Ramsden et al. 2012; Luyster et al., 2007; Simonoff et al., 2021), suggesting that language/intellectual ability profiles could be markedly different in autistic adults compared to children. Generally, links between nonlinguistic cognition and language in autism are in need of clarification (Lewis et al., 2008).

Objectives: To explore whether ICD-11 language/intellectual ability profiles are observable in autistic adults and what their prevalence is.

Methods: Adults with an ASD diagnosis, and no conditions associated with language/cognitive impairment, drawn from a university hospital patient database were considered for inclusion. We retained those for whom there were language assessment results (two scales providing Expressive language and Receptive language scores) and intellectual ability assessment results (from a general cognitive scale for all, and, for most, a standard nonverbal test): 241 individuals, ages 18 to 58 (M=29yrs, SD=10). Autism symptomatology was explored via ADI-R subscales and via two ordinal clinical severity scales (Hameury et al., 1995). Language and intellectual ability profiles were identified via K-means clustering, compared for autism symptomatology, and validated using Rand Index metric and Random Forest classification.

Results: Three K-means cluster analyses using language measures and a measure of intellectual ability performed over the entire group of 241 individuals based on a measure of general intellectual development, a subgroup of 92 individuals for whom there was an available NVIQ, and a subgroup of 89 individual for whom there was an available nonverbal developmental age, returned clusters corresponding to ICD-11 homogenous categories (both DID and LI/absence of language or neither), but just one heterogeneous category, with DID and with mild or no LI. Missing was a without-DID-and-with-LI cluster. Hand inspection revealed five such individuals (2% of sample). Measures of autism symptomatology failed to distinguish most clusters from each other.

Conclusions: Language/intellectual ability profiles in autistic adults appear to differ from those found in autistic children. Notably, a common profile in autistic children, absence of DID with presence of LI, the profile of Developmental Language Disorder, was found to be extremely marginal in adults, possibly due to language catch-up, but also to NVIQ lowering in the presence of significant LI.

401.064 (Poster) Life Outcomes and Quality of Life in the Maudsley Cohort, a Longitudinal Follow-up
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Background: A number of studies have reported poor objective outcomes (typically a composite rating made up of employment, living status, and social relationships) for cohorts of autistic adults. Typically, higher IQ and fewer autism characteristics are common predictors of having a better outcome.

Objectives: To investigate the objective and subjective life outcomes (i.e., quality of life) in the Maudsley cohort (a cohort of autistic individuals originally diagnosed as autistic children in the 1950s, 1960s, and 1970s).

Methods: This study employs a mixed methods approach. Autistic participants completed the ADOS, WAIS-4, and multiple self-report measures (including mental health and quality of life). Relatives of autistic participants completed the Family History Schedule, Vineland
Adaptive Behaviour Scales, and the current items on the ADI-R. A subset of the autistic participants in this sample were recruited to an interview study, in order to explore their experiences of ageing and how they have changed over time.

Results: Preliminary analyses suggest that the objective outcomes of autistic adults are comparable to previous studies using this measure. Specifically, 17.1% of participants were rated as having a good or very good outcome, 24.1% were rated as having a fair outcome and 58.8% were rated as having a poor or very poor outcome. Qualitative data however, such that – of those interviewed – life had become better over the lifespan. Specifically, many had found fulfilling work and had accepted their differences.

Conclusions: Objective life status in this cohort may not be comparable to normative goals, however, autistic people thought that, often, their ageing trajectory had been positive and reported a strong sense of positive autistic identity.

401.066 (Poster) Analysis of State Records to Characterize Frequencies of State Identification, Voting, Marriage, and Child Birth Among Autistic Adults

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Background: Studies of outcomes for autistic adults have focused primarily on employment and living arrangements, with less known about other important aspects of autistic adult life participation. However, available evidence indicates that autistic adults are often not satisfied with their level of community participation and social roles. State-level administrative data offer opportunities to understand autistic adult participation in certain meaningful activities in adulthood.

Objectives: In this study, we accessed state administrative data on autistic adults and matched comparisons to examine participation in receiving a form of state identification, voting, marriage, and parenting children.

Methods: We conducted secondary data analysis with state-level data in the U.S. state Utah. Secure linkages were performed with state administrative records to the Utah Registry of Autism and Developmental Disabilities to identify autistic adults. For this analysis, we accessed data on N=9,560 autistic adults born between 1920 and 2005, and who were subsequently each age- and sex-matched to three non-autistic residents (N=28,624). To compare autistic adults to the other state residents, we calculated counts, percentages, and 95% confidence intervals for receipt of state identification (driver’s license or other state ID), voting participation, marriage and divorce/separation, and parenting a child born in Utah (i.e., a child born with the individual listed as one of the parents on the birth certificate). We also analyzed the number of children, range, mean, standard deviation, and 95% confidence intervals between autistic adults and comparisons who had parented children.

Results: The autistic group was 76.9% male, with a mean (standard deviation) age of 24.28 (9.82) years. The non-autistic comparison group was also 76.9% male, with a mean (standard deviation) age of 24.33 (9.90) years. Just over half of autistic adults had a form of state identification, compared with over 90% of the non-autistic adults. Voting participation was low in both groups, with autistic adults slightly but significantly less likely to vote (see Table 1). Autistic adults were also significantly less likely to have ever been married (3.8% vs. 13.9%) and to have children (3.9% vs. 19.1%), but slightly more likely to have been divorced (0.9% vs. 0.4%). Autistic adults who had been a parent had fewer than 2 children on average, compared with over two in the comparison group.

Conclusions: Rates of state identification were substantially lower among autistic than non-autistic adults. Holding a valid form of identification can be important for various kinds of participation in the community such as attending events or traveling; thus, these findings suggest a need for concerted efforts to support autistic youth and adults to acquire an official form of ID. Rates of voting, marriage, and parenting children were all also lower in the autistic than comparison group—autistic adults interested in these pursuits may require additional support and resources. Finally, it was notable that more autistic adults had been through divorce; this may signal a need for tailored relationship support for autistic adults and couples. There may also be a need for tailored supports for autistic adults navigating divorce.

401.067 (Poster) Diagnostic Associations with Suicide Death: A U.S. Statewide Analysis of Mental and Physical Health Conditions Among Autistic People Who Died By Suicide

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Background: A growing body of research indicates that autistic individuals are at higher risk for death by suicide than the general population. Suicide is known to be highly associated with mental health conditions such as anxiety, bipolar disorder, depression, personality disorders, psychosis, and substance abuse; studies also point to numerous physical health conditions (e.g., asthma, brain injury, cancer, diabetes, epilepsy, and pain conditions) associated with higher rates of suicide. However, less is known about co-occurring risk of suicide among autistic people with co-occurring mental and physical conditions.
Objectives: The current study is an investigation of co-occurring conditions observed among autistic individuals who died by suicide in one U.S. state.

Methods: Secondary data analysis was conducted with state-level data in Utah. Secure linkages were performed to match medical billing data (i.e., ICD-9 and ICD-10 codes) to a statewide database of individuals determined by the state medical examiner to have died by suicide. Billing data was provided from the two largest healthcare systems in Utah (covering >85% of the state) as well as from the Utah Population Database, which houses all inpatient codes from hospitals throughout the state. An additional linkage was performed to a statewide database of individuals classified as autistic (the Utah Registry of Autism and Developmental Disabilities). Analyses included descriptive statistics and chi-squared tests to compare autistic people who died by suicide to other suicide decedents, as well as examining sex differences in the autistic group.

Results: We accessed billing codes for 7,284 individuals who died by suicide in Utah between 1998-2017: 47 autistic individuals (i.e., autistic suicide decedents) and 7,237 other individuals (i.e., non-autistic suicide decedents); see Table 1. Autistic suicide decedents were significantly more likely than non-autistic suicide decedents to have received codes for depression, anxiety, substance abuse problems, bipolar or cyclical mood disorders, sleep disorders, attention-deficit or impulsivity conditions, psychosis, personality disorders, post-traumatic stress, and obsessive-compulsive disorder. Autistic decedents were also more likely to have had documented asthma, epilepsy/seizures, obesity, and pain codes. No significant differences were identified for autoimmune disorders, cancer, diabetes, eating disorders, gastrointestinal symptoms, or brain injury. Autistic women who died by suicide were significantly more likely than their male counterparts to have anxiety, post-traumatic stress, psychosis, and personality disorders.

Conclusions: Depression and anxiety were the most common co-occurring conditions coded in medical records of autistic individuals who died by suicide. Results indicated that these and other mental and physical health conditions were more common among autistic decedents than among other people who died by suicide in Utah. The reported frequencies of many of the examined conditions were also significantly higher in the autistic decedents than reported in U.S. ICD-code based studies of conditions co-occurring with autism. Co-occurring conditions should be considered along with other suicide risk factors to understand autistic community risk and potential prevention needs. These preliminary findings suggest that both mental and physical health conditions should be considered in future studies, and in the development of suicide risk assessments and prevention approaches for autistic individuals.

401.068 (Poster) Do Autistic Traits Affect Creativity in College Students?
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Background: There is a widespread belief that autistic individuals are not creative. The Autism-Spectrum Quotient, a common measure of autistic traits, even includes an imagination subscale. However, autistic traits may be associated with divergent thinking, a component of creativity. Creativity and the autism spectrum is a relatively unexplored topic.

Objectives: The current study investigated whether college students with high levels of autistic traits differed from college students with low levels of autistic traits in creative problem solving or self-reported creativity.

Methods: Seventy-four college students (M = 19.7 years, SD = 1.4) completed the Remote Associates Test (RAT). For each of 125 problems, participants were given three words (e.g., pine, crab, sauce) and asked to come up with a single word (e.g., apple) that creates a compound word or common phrase with each of the provided words (e.g., pineapple, crab apple, applesauce). If participants solved a problem within the 30-second time limit, they were asked if the solved the problem with insight (i.e., an aha! experience) or without insight. Afterwards, participants completed the Creative Achievement Questionnaire (CAQ) to assess creativity achievement in 10 domains (visual arts, music, creative writing, dance, drama, architecture, humor, scientific discovery, invention, and culinary) and the Autism-Spectrum Quotient to assess level of autistic traits. Participants were divided into low and high autistic trait groups using a median split on the AQ.

Results: Insight solutions were more accurate (F(1, 69) = 69.53, p < .001) and faster (F(1, 69) = 28.66, p < .001) than non-insight solutions. Participants with high levels of autistic traits tended to be more accurate than participants with low levels of autistic traits (F(1, 69) = 3.46, p = .07); however there was no difference between participants with high and low autistic traits in reaction time (F(1, 69) = 0.11, p = .74). Type of solution (insight or noninsight) did not interact with level of autistic traits for either accuracy (F(1, 69) = 0.14, p = .71) or reaction time (F(1, 69) = 0.01, p = .92). Furthermore, autistic trait groups did not differ in the percentage of problems solved (t(72) = 0.75, p = .46) or the percentage of problems solved with insight (t(72) = -0.19, p = .85) on the RAT. Finally, autistic trait groups did not differ in total CAQ scores (t(72) = 0.66, p = .51) or any of the individual domains (all ps > .10). Similarly, total AQ scores were not correlated with total CAQ scores (r(72) = -0.02, p = .90). Only the imagination subscale of the AQ showed a marginal correlation with CAQ scores (r(72) = -0.22, p = .06).

Conclusions: College students with higher levels of autistic traits did not differ from college students with lower levels of autistic traits in two measures of creativity: a creative problem-solving task, and self-reported creativity across multiple domains. While these findings need to be replicated with a more representative sample and in autistic people, they suggest autistic traits are unrelated to creativity.
Background: Extensive research has been conducted regarding implicit and explicit attitudes for gender and race. Recent research has considered implicit and explicit attitudes towards disability; however, the focus has been on visible disabilities such as physical disabilities. Very few studies have considered implicit and explicit attitudes towards the autism spectrum.

Objectives: The current study investigated implicit and explicit attitudes toward the autism spectrum in adults. Furthermore, the study assessed whether contact with individuals on the autism spectrum, autistic traits, and self-identifying as autistic are related to implicit and explicit attitudes.

Methods: Four hundred sixteen adults (M = 42.3 years, SD = 14.1) were recruited from Amazon Mechanical Turk. The majority of participants were non-autistic (94.5%). Participants completed the Implicit Association Test (IAT) where they sorted good and bad words and/or autism-related and non-autism related words. This task detects the strength of the automatic association between the autism spectrum and good or bad. Afterwards, participants completed an adapted version of the Societal Attitudes Towards Autism Scale (SATA), a measure of explicit attitudes toward the autism spectrum. Participants also completed a brief questionnaire about their contact with individuals on the autism spectrum and the Autism-Spectrum Quotient (AQ), a measure of autistic traits.

Results: Participants had a significant implicit bias (M = -0.27, SD = 0.50) against the autism spectrum, (t(416) = -10.9, p < .001, d = -0.53). Implicit attitudes were positively associated with contact with individuals on the autism spectrum (r(414) = .25, p < .001), but not autistic traits (r(414) = .06, p = .21) or explicit attitudes (r(414) = -.05, p = .30). Implicit attitudes were negatively associated with age (r(414) = -.20, p < .001). An exploratory analysis revealed that participants who self-identified as autistic had significantly more positive implicit attitudes toward the autism spectrum than participants who identified as non-autistic (t(364) = 4.90, p < .001, d = 1.13). Participants who self-identified as autistic had more contact with individuals on the autism spectrum (t(364) = 7.50, p < .001, d = 2.06) and more negative explicit attitudes toward the autism spectrum (t(362) = 2.55, p = .01, d = 0.59).

Conclusions: Overall, adults have an implicit bias against the autism spectrum and non-autistic adults have a more negative implicit bias than autistic adults. Implicit attitudes are unrelated to explicit attitudes, suggesting that conscious and unconscious attitudes toward the autism spectrum are independent. Furthermore, non-autistic adults have more positive explicit attitudes than autistic adults, suggesting social desirability may affect explicit attitudes of non-autistic adults. Greater contact with individuals on the autism spectrum is associated with more positive implicit attitudes towards the autism spectrum. Future research should consider more direct tests of how contact with autistic individuals may affect implicit attitudes. Finally, age is negatively associated with implicit bias, suggesting that younger participants may have more positive implicit attitudes toward the autism spectrum. This may reflect minor improvements in implicit attitudes across generations. These results highlight the need to confront unconscious attitudes as a source of ableism.

Objectives: The current study investigated camouflaging behaviors in a sample of college students and the general population. More specifically, we explored the relationship between autistic traits, camouflaging behavior, and cognitive style.

Methods: Fifty-one undergraduate students between ages 18 and 22 years (M = 19.1, SD = 1.1) were recruited from a small, east coast liberal arts college and 105 adults between 18 and 28 years were recruited from Amazon Mechanical Turk (M = 24.6, SD = 1.9). Approximately 5% of participants self-identified as autistic (undergraduates: 5.6%; Mechanical Turk: 5.7%). All participants completed the Cognitive Reflection Test (CRT). The seven-item multiple-choice CRT comprised math word problems involving arithmetic and supposedly easy to manipulate numbers with four possible solutions: a primed intuitive answer, a mathematically correct answer, and two answers indicative of a failure to correctly determine how to frame and solve the problem. Reflectiveness and intuitiveness scores indicate the number of correct reflective responses and incorrect intuitive responses, respectively. Participants also completed the Camouflaging Autistic Traits Questionnaire (CAT-Q). The CAT-Q is a 25-item Likert-scored (5 reverse scored) self-report of camouflaging behaviors based on the masking, assimilation, and compensation strategies autistic people reported as methods for camouflaging their autistic characteristics. Finally, participants completed either the Broad Autism Phenotype Questionnaire (BAPQ) or the Autism-Spectrum Quotient (AQ) to assess autistic traits.

Results: Autistic traits were significantly positively correlated with camouflaging behaviors in both the undergraduate (r(49) = .68, p < .001) and Mechanical Turk (r(103) = .45, p < .001) samples. Specifically, autistic traits were positively correlated with masking behaviors in the undergraduate sample (r(49) = .38, p = .006), but not the Mechanical Turk sample (r(103) = .01, p = .33). Autistic traits were also
correlated with assimilation (undergraduate: r(49) = .79, p < .001; Mechanical Turk: r(103) = .72, p < .001) and compensation (undergraduate: r(49) = .52, p < .001; r(103) = .31, p = .001) behaviors in both samples. In the undergraduate sample, autistic traits were positively associated with reflective responses (r(49) = .36, p = .009), but not intuitive responses (r(49) = -.05, p = .73). Camouflaging behaviors also tended to be positively associated with reflective responses (r(49) = .27, p = .05), but not intuitive responses (r(49) = .02, p = .89). In the Mechanical Turk sample, neither autistic traits nor camouflaging behaviors were correlated with reflective or intuitive responses (all ps > .30).

Conclusions: People with greater autistic traits exhibit greater degrees of camouflaging behavior, including masking, assimilation, and compensation behaviors. The association between cognitive reflection, autistic traits and camouflaging behavior was mixed, warranting further investigation.

401.071 (Poster) How Do Autistic People Fare in Adult Life and Can We Predict It from Childhood?

Background:

Young autistic adults face variable but often substantial challenges in adult life. Understanding childhood predictors of outcomes in adulthood is important as to set expectations for autistic people and their families, inform theory of developmental mechanisms, and identify new areas for intervention. With a few exceptions, existing studies on outcomes in adulthood for autistic people have not sought representative samples, limiting the generalisability of their findings. In this work we report on outcomes in adulthood from the Special Needs and Autism Project (SNAP), an influential cohort formed by screening all children living in a particular area with an autism diagnosis or judged to be at risk of autism and conducting diagnostic interviews on a stratified sample.

Objectives:

The aim of this study is to describe parent report social, mental health, and quality of life outcomes in adulthood and examine childhood predictors in SNAP, a longitudinal population-based cohort and to place these findings in the context of the general population and other studies of autistic adults.

Methods:

Autistic children were enrolled at age 12 and parents reported outcomes 11 years later when their children were age 23 (n = 121). Regression analysis were carried out to identify childhood predictors of outcomes.

Results:

Thirty six percent of autistic adults were in competitive employment or education and 54% had frequent contact with friends. Only 5% of autistic adults were living independently, and 37% required overnight care. Moderate or severe anxiety and depression symptoms were found for 11% and 12% of young adults, respectively. Subjective quality of life was similar to UK national average except for social relationships. Using childhood IQ, autism traits and adaptive functioning, meaningful predictions can be made of living situation, employment and education and physical health. Prediction was poor for friendship, mental health outcomes and other aspects of quality of life.

Conclusions:

Young autistic adults are less likely than the general population to live independently, be in employment, have close friendships and may have worse physical and social quality of life. Previous studies of normative social outcomes may however have overstated the challenges
autistic adults face in these areas. Participants in this cohort also were reported to have better mental health and quality of life than had been found in previous studies.

Good prediction from childhood is possible for living situation and employment and education and this may support targeted intervention in these areas. IQ, autism traits and adaptive functioning are most useful for predicting outcomes. After accounting for these factors, childhood measurements of behavioral and emotional problems and language offered little improvement in prediction of adult outcomes. For mental health or quality of life we found prediction from childhood to be much more challenging. For these outcomes our findings suggest that it is inappropriate to set expectations as to what outcomes may be in adulthood, that good outcomes may be possible for autistic people regardless of their childhood characteristics, and that interventions to support those with difficulties in these outcomes should be available for all.

401.072 (Poster) Developing Prediction Models for Outcomes in Adolescence and Adulthood for Autistic Children

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Background:

There is considerable variability in outcomes for autistic children in adolescence and adulthood, with some autistic people having high support needs or experiencing poor mental health, or lower quality of life. Across these different aspects of life there is more or less certainty in outcomes. To date longitudinal studies have identified predictors of outcomes, however it is extremely challenging to translate knowledge of predictors into individual level predictions for a particular autistic child. A solution to this problem is to create statistical models that provide individual level prediction. Prediction models however, require greater sample sizes than models for statistical inference, and these sample sizes are larger than are available in any single existing longitudinal study. We propose to combine data from cohorts of autistic people and general population cohorts with large autistic sub-populations and conduct an individual participant data (IPD) meta-analysis to develop prediction models. We will present findings from a systematic review to identify longitudinal studies of autistic people, descriptive data of the identified samples, and the protocol for the development of the prediction models

Objectives:

The objective of the systematic review was to identify longitudinal studies of autistic people that contain data that can be used for the development of prediction models for outcomes in adolescence and adulthood.

Methods:

We conducted a systematic review of the literature (PROSPERO registration CRD42021286449). We searched MEDLINE, EMBASE, PsycINFO and Web of Science. Eligible studies have more than 50 autistic participants with at least 2 years of follow up, and an initial assessment prior to age 14. Studies must include assessments of either behavioral and emotional problems in adolescence or one of a broad range of outcomes in adulthood (eg. living situation, employment or education, mental health outcomes, quality of life). Risk of Bias assessments are conducted using the PROBAST risk of bias tool, specifically developed for prediction modelling meta-analysis.

Results:

Twenty two longitudinal studies were identified that meet the eligibility criteria with a total eligible sample size over 3000. If combined, the studies would include over 400 females (16%). Across studies with available IQ data, mean IQ is 77. Further details of identified studies will be presented, including risk of bias assessments and key findings alongside the proposed methodology for the development of prediction models.

Conclusions:

We have identified a rich collection of longitudinal studies that together can be used to develop prediction models which may be applied directly in clinical practice. Combining datasets will create the largest dataset to date which follow autistic children into adulthood. As well as improved sample size, combining data sets allows the generalizability of models developed to be assessed by considering variation in model performance across the different samples included. The large sample size will also allow differences in outcomes in under-represented groups to be fully examined. This rich resource may go on to be used to interrogate developmental mechanisms and answer questions of direct clinical relevance.

401.073 (Poster) Gender Affirmation, Regardless of Level of Autistic Traits, Predicts Lower Mental Health Distress in Gender-Diverse and Transgender Adults
Background: Somewhere between 4.8% and 26% of adults presenting to gender dysphoria clinics have an autism diagnosis and some studies have shown that there are elevated rates of autistic traits in those who are gender diverse. Both autistic and gender-diverse people have higher rates of mental health conditions including anxiety and depression and are more likely than the general population to experience suicidal ideation and to attempt to die by suicide. This double burden puts gender-diverse autistic people at high risk for developing intense mental health concerns that negatively impact their quality of life. Some work suggests that gender affirmation leads to better mental health outcomes, but this has not been studied directly in autistic adults who identify as gender-diverse or transgender.

Objectives: To assess the impact of gender affirmation on mental health outcomes for gender-diverse autistic and non-autistic adults.

Methods: Data regarding gender diversity, gender affirming care history, depression, anxiety, autistic traits, and executive functioning were collected via an online survey as part of a larger project. Data were analyzed for 100 gender-diverse adults, 49% of whom identified as autistic, either through formal (18%) or self-diagnosis (31%). Ages of participants ranged from 19 to 56 (M = 27.3, SD = 7.7). 72% of participants were assigned female at birth. 35% of participants identified as male, 17% identified as female, 28% identified as nonbinary, and 19% identified with another undisclosed identity or were exploring their gender and were not sure about their gender identity. 75% of participants identified as white, 3% identified as Middle Eastern/North African, and 22% identified as multiracial. 80% of participants disclosed that they have a disability.

Results: To assess overall mental health distress, we combined scores from the Beck Depression Inventory-II and the Beck Anxiety Inventory. To quantify aspects of gender affirmation we counted steps a participant had completed (i.e., social transition, puberty blockers, gender affirming hormones, gender affirming surgical procedures). Autistic traits were measured dimensionally using the 50-item Autism Spectrum Quotient. Regression analysis of the impact of gender affirmation on mental health distress indicated that there is a significant effect for gender affirmation (r = -3.945, p = 0.001), but not for autistic traits (r = 0.54, p = 0.59) (F(2) = 8.03, p = 0.002). This suggests that the variance in mental health in our sample is better explained by gender affirmation than by autistic traits, though both gender diversity and autistic traits have been previously linked to both anxiety and depression.

Conclusions: These findings suggest that while there is a double burden of being both autistic and gender diverse in developing mental health conditions such as anxiety and depression, gender affirmation improved mental health outcomes for gender-diverse adults, whether or not they exhibit high degrees of autistic traits. This suggests that for gender-diverse autistic adults, gender affirmation is a clear pathway toward improved mental health outcomes.

401.074 (Poster) Mental Health Distress Impacts Executive Functioning More Than Autistic Traits or Gender Affirmation

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Background: Navigating the world as a gender-diverse person requires a great deal of executive functioning capacity. Deciding who is safe to come out to, navigating the medical system to receive gender affirming care, and planning, organizing, and making big decisions regarding gender care is an exhausting process. Between 4.8% and 26% of adults presenting to gender dysphoria clinics have an autism diagnosis and some studies show that there are elevated rates of autistic traits in the remaining. Executive functioning challenges have been observed in both autistic and gender-diverse people and intersectionality may lead to an extra cognitive load on executive functioning resources.

Objectives: To assess the impact of gender affirmation, mental health distress, and autistic traits on executive functioning in gender-diverse adults.

Methods: Data regarding gender diversity, gender affirming care history, depression, anxiety, autistic traits, and executive functioning were collected via an online survey as part of a larger project. Data were analyzed for 100 gender-diverse adults, 49% of whom identified as autistic, either through formal (18%) or self-diagnosis (31%). Ages of participants ranged from 19 to 56 (M = 27.3, SD = 7.7). 72% of participants were assigned female at birth. 35% of participants identified as male, 17% identified as female, 28% identified as nonbinary, and 19% identified with another undisclosed identity or were exploring their gender and were not sure about their gender identity. 75% of participants identified as white, 3% identified as Middle Eastern/North African, and 22% identified as multiracial. 80% of participants disclosed that they have a disability.

Results: To assess overall mental health distress, we combined scores from the Beck Depression Inventory-II and the Beck Anxiety Inventory. To quantify aspects of gender affirmation we counted steps a participant completed (i.e., social transition, puberty blockers, gender affirming hormones, gender affirming surgical procedures). Autistic traits were measured dimensionally using the 50-item Autism Spectrum Quotient. We measured executive functioning using the Global Executive Composite from the Behavior Rating Inventory of
Executive Function for Adults. Regression analysis of the impact of gender affirmation, autistic traits, and mental health distress on executive functioning indicated that there was a significant effect overall ($F[3] = 9.31, p < 0.001$) that can be attributed to the impact of mental health distress ($t = 4.83, p < 0.001$), but not to autistic traits ($t = 0.54, p = 0.60$) or gender affirmation ($t = 1.51, p = 0.14$).

Conclusions: These findings suggest that there is a pathway to help support gender-diverse autistic people by supporting them in managing their mental health distress that can improve their overall executive functioning. This is likely because mental health distress also consumes executive functioning resources, further depleting a low-capacity and high-need resource. It is important to note that though the data do not suggest that gender affirmation is impacting executive functioning in our sample, it is established that there is a link between gender affirmation and improved mental health in gender-diverse people, so this pathway can be impacted by improving access to gender affirming care and other forms of gender affirmation in addition to treating depression and anxiety directly.

**POSTER SESSION — ADULT OUTCOME: MEDICAL, COGNITIVE, BEHAVIORAL**

**420 - Adult Outcome: Medical, Cognitive, Behavioral II**

**420.001 (Poster) Mortality Rate and Age of Death Among Medicare-Enrolled Autistic Older Adults in the United States**

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**Background:** An emerging body of evidence suggests that autistic people are at greater risk for mortality than non-autistic people. Most of this literature focuses on autistic children and young adults or combines autistic older adults (age 65 or older) with younger age groups, making it hard to differentiate mortality rates among autistic older adults specifically. By the year 2050, there will be about 1.16 million autistic adults aged 65 years or older in the United States, necessitating a better understanding of this populations’ health needs and outcomes. As a result, data about mortality rates in older autistic adults are needed to inform initiatives by healthcare systems, providers, and policy makers to maximize life expectancy among autistic older adults.

**Objectives:** Compare mortality rate and age of death among Medicare-enrolled autistic and non-autistic older adults.

**Methods:** We performed a retrospective cohort analysis of 2016 through 2020 Medicare Standard Analytical Files (SAF). Medicare is a nationally administered program that provides nearly universal healthcare coverage to Americans aged 65 and older (including autistic and non-autistic older adults). Autistic older adults (n=4,685) were included if they: (1) were age 65 and older; (2) were enrolled in Medicare for at least 6 months to ensure enough follow up time; and (3) had at least one inpatient or outpatient claim with an autism diagnosis during January 1, 2016 through December 31, 2017. We also identified a population comparison (PC) group of age and sex-matched adults without autism diagnoses (n=46,850). The primary outcome of this study was the number of years from age 65 to the beneficiary’s death, which is recorded in the SAF and validated by the United States Social Security Administration. Beneficiaries with no recorded date of death by December 31, 2020 were assumed to be alive at the end of the observation period. Cox proportional hazard regression models were used to compare overall survival between autistic and PC beneficiaries while controlling for demographic characteristics.

**Results:** Table 1 provides sample characteristics. More autistic beneficiaries died during the study period (36.1%) than PC beneficiaries (15.3%). Autistic decedents were a median age of 72 years (interquartile range [IQR]=68, 78) while the corresponding figure for PC decedents was 74 years (IQR=69, 83) (Figure 1). The hazard rate of death for autistic beneficiaries was 2.37 times higher than that of PC beneficiaries (Adjusted Hazard Ratio [95% Confidence Interval]; 2.37 [2.21-2.54]).

**Conclusions:** To our knowledge, our study is the first to use US national data to examine mortality rates among autistic older adults. Many trends regarding mortality observed in younger samples of autistic people were also observed in our study. Specifically, rates of mortality were greater among autistic than PC older adults. However, we found a two-year difference in median age at death between autistic and PC decedents, which is a much smaller disparity than reported in some other studies. Although preliminary, our findings may indicate that autistic people who survive into older adulthood live to a more similar, though somewhat reduced, age as their non-autistic peers.

**420.002 (Poster) Musical and Linguistic Prediction in English-Speaking Individuals with Autism**

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**Background:** Storing structural regularities, present both in music and language, and drawing upon learnt associations are essential mechanisms for making accurate online predictions (Cannon et al. 2021; Perruchet & Pacton 2006). Research into predictive processing in autistic individuals has pointed to impairments in making reliable predictions about upcoming information (Lawson et al. 2014; Pellicano & Burr 2012; Sinha et al. 2014).
**Objectives:** The overarching aim of this work was to compare predictive processing in music and language, and to determine how predictive musical processing in autistic individuals compares to analogous judgements in the speech domain.

**Methods:** To this end, four tasks with 45 trials each were designed: a melodic cloze task, a sentence cloze task, a melodic rating task, and a sentence rating task. High- and low-constraint melodies/sentences were employed, with high-constraint items corresponding to trials whereby the probability to complete a stem with a given note/word was high. In the melodic tasks, high probability items were those eliciting strong expectations given the tonal structure of a melody; in the speech trials, higher probability responses were those better fitting the semantic context of a sentence based on established norms (Arcuri et al., 2001). Twenty-one English-speaking autistic participants and forty-nine non-autistic controls took part in the study. Participants were expected to produce a note/word for the two cloze tasks and expectedness ratings for the stimuli in the other two tasks.

**Results:** The performance of the two groups was not found to differ significantly in the melodic cloze task, but autistic participants performed significantly worse on the sentence cloze task. Autistic participants displayed faster reaction times than controls on the melodic cloze task but a slower response on the sentence cloze task. No significant group differences were found for the melodic or sentence rating task. Autistic participants outperformed controls in singing higher probability notes and assigning higher ratings to higher cloze probability melodies (see Figures 1 and 2).

**Conclusions:** Our findings suggest that autistic individuals have implicit knowledge of tonal regularities despite their difficulties in making semantic predictions. Their preserved ability to form melodic expectations could be attributed to efficient statistical learning in the domain of music (Foti et al. 2015; Obeid et al. 2016). However, this ability does not seem to be matched by performance on the sentence cloze task; autistic participants’ linguistic prediction was impaired, in line with previous findings (e.g., Booth & Happé 2010; Henderson et al. 2011; Jolliffe & Baron-Cohen 1999). Similar difficulties in autism have been traced to ‘weak central coherence’ (Happé & Frith 2006), poorer vocabulary (Brown et al. 2013; Lucas & Norbury 2014), and more limited world knowledge (Howard et al. 2017), among other theories. Nevertheless, typical performance on the sentence rating task suggests that when sentences are already completed, autistic individuals seem sensitive to semantic expectancies, perhaps pointing to a production-perception dissociation. Speech production impairments in particular do not seem to impinge on the ability to process melodic information and to produce appropriate responses based thereon.

**Background:**

Autistic people in professional roles, such as education and health, are at risk of underemployment and working in positions below their qualifications. Issues of poor participation, exclusion and impoverished longer-term outcomes require urgent remediation. Here, understanding people’s own lived experiences is not only valuable, but completely essential.

**Objectives:**

The experience of autistic professionals is an area where little high quality research is available. In this study, we qualitatively explored the experiences of autistic teachers and autistic health professionals in Scotland. We explore supportive factors described by autistic people, identify how context, including organisational culture or environment contribute, and understand their journey to successful employment.

**Methods:**

The project has worked closely with autistic people, with two autistic researchers in the team. There were two study phases: (1) systematic review of qualitative research on the experiences of autistic adults in health or education roles (2) online qualitative interviews with autistic people in Scotland. Data is being collected for both studies. For the qualitative study, forty participants will be enrolled by January 2023 (15 to date). Inclusion criteria was diagnosis of Autism, aged>18, ability to participate in interview, currently working in statutory role in health (e.g. doctor) or statutory education role (e.g. schoolteacher). Each participant completes a 60-90 minute semi-structured interview focussed on their training, recruitment, work, disclosure of autism, and recommendations. Additional data collected include demographics, diagnosis history, age and previous working history. For the systematic review electronic databases were searched using a broad range of keywords, to identify English-language primary studies on autistic experiences in health and education roles. Data extraction and synthesis followed PRISMA. Quality appraisal was completed. Full details of the review methodology are available [PROSPERO].
Results:

For the systematic review, a very small pool of research has been identified. The limited literature that does exist provides some indication around how to best develop employment opportunities for autistic people, but overall, there remains limited research. Preliminary data from the primary qualitative study reflects a high level of interest in the need for greater understanding of autistic people in health and education roles. Initial analysis suggests that autistic adults desire support (individually and/or environmental modifications) to manage sensory preferences, social communication, and with specific areas of work, such as interviews and recruitment. Participants have expressed contrasting views on disclosure, with this being an individual choice. Non-disclosure is linked to fear/prejudice. Recommendations have been made for improvements and training needed for professionals and organisations. Further qualitative analysis is underway and will be synthesised with the extant research on completion.

Conclusions:

It is necessary to understand how individuals have achieved their employment positions to increase participation and to understand problems with career engagement and success, and what barriers may be modifiable to improve engagement and outcomes. This research will be used to support development of experience-based good practice guides focused on making health and education careers and workplaces more accessible and less discriminatory for autistic people.

420.005  (Poster) Neuroimaging Markers of Early Aging in Autism Spectrum Disorder

Background: Autism spectrum disorder (ASD) is a lifelong diagnosis with developmental impacts that persist across the lifespan. Studies focused on aging populations in autism using administrative data indicate ASD is associated with a shorter life expectancy, higher rates of serious physical and mental health issues, and higher rates of dementia and motor disorders. Yet, the majority of autism neuroimaging research studies have investigated the brain in children and adolescents. The Interdisciplinary Science to Learn about Autism (ISLA) longitudinal study represents one of the longest running longitudinal neuroimaging studies of autistic adults, collecting up to 6 timepoints of data over 18 years.

Objectives: Utilize neuroimaging data acquired as part of the ISLA longitudinal sample to investigate patterns of aging in the autistic brain, specifically focused on cortical and microstructural measures of the brain derived from structural and diffusion MRI methodologies.

Methods: Participants included 176 individuals (n=87 ASD) between 12 and 57 years of age who underwent imaging on a Siemens 3T PRISMA scanner using a 64-channel head coil. A sagittal MP2RAGE scan with 1 mm isotropic resolution was additionally acquired to assess cortical morphometry, while a 4-shell diffusion imaging protocol was performed to assess the white matter microstructure. MP2RAGE T1-weighted images were processed using FreeSurfer while diffusion images were processed using an in-housing processing pipeline utilizing functions from DIPY toolkit, FMRIB Software Library (FSL), and MRtrix software packages. Mixed effects models were used to investigate longitudinal patterns of cortical thickness from FreeSurfer derived measures. Group differences and age-by-group interactions of diffusion MRI metrics were examined using linear models with R software.

Results: Preliminary analysis of ASD vs TDC longitudinal cortical thickness across 5 timepoints demonstrated longitudinal differences that were predominantly in the frontal and parietal lobes: all left parietal lobe regions in ASD were thinner by 20 years of age. Analysis of white matter microstructure showed widespread significant differences between ASD and TDC subjects, such that the ASD group had significantly lower neurite density across the white matter, including the genu of the corpus callosum, superior longitudinal fasciculus, and uncinate fasciculus (p<0.05, corrected).

Conclusions: Utilizing advanced structural and diffusion MRI, we observed significant differences and age-related deviations in the autistic brain. Regional temporal lobe thinning was localized, suggesting regionally dynamic cortical thickness changes are not consistent across the entire brain. The ASD vs TDC differences suggest ongoing atypical brain maturation in ASD. Future studies utilizing state-of-the-art quantitative imaging techniques to investigate biologically sensitive measures of brain microstructure and function will be of critical importance for further understanding of aging related patterns in autism. In particular, the ISLA-A Network, a newly funded NIH Autism Center for Excellence, will build upon the foundation that the ISLA longitudinal study has provided and perform a comprehensive prospective longitudinal study that will focus on aging in autism.

420.006  (Poster) Perceived Misdiagnosis of Psychiatric Conditions in Autistic Adults
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Background: Many autistic people do not receive an autism diagnosis until adulthood, delaying their access to timely support and clinical care. One possible explanation for a delayed diagnosis is that autistic traits may initially be misinterpreted as symptoms of other psychiatric conditions. This may lead some individuals to experience misdiagnosis of other psychiatric conditions prior to their autism diagnosis. However, very little is currently understood about the frequency and nature of psychiatric misdiagnoses in autistic adults.

Objectives: This study is one of the first of its kind – using a large sample of autistic adults – to explore the frequency of perceived misdiagnoses of psychiatric conditions that were given before a diagnosis of autism was obtained, as well as to investigate possible gender differences.

Methods: Using data from a longitudinal register of autistic adults in the Netherlands, this study explored the frequency of psychiatric diagnoses perceived as a misdiagnosis before receiving an autism diagnosis. Gender differences in perceived misdiagnoses were explored using logistic regression. A sample of 1211 autistic adults (52.6% women, mean age 42.26 years) was evaluated.

Results: Results showed that 24.6% \( (n = 298) \) of participants reported at least one previous psychiatric diagnosis that was perceived as a misdiagnosis. Personality disorders were perceived as misdiagnoses most frequently (12.3%), followed by anxiety disorders (6.6%), mood disorders (6.2%), chronic fatigue syndrome/burnout-related disorders (9.6%), and attention-deficit/hyperactivity disorder (4%). Women and men were equally likely to report at least one perceived misdiagnosis. However, women were significantly more likely than men to report a perceived misdiagnosis of personality disorders, anxiety disorders, and mood disorders.

Conclusions: The findings suggest that there is a high frequency of perceived misdiagnoses across a range of psychiatric conditions, with significant gender differences observed specifically in relation to personality disorders, anxiety, and mood disorders. Current findings highlight the need for healthcare professionals to screen for autism earlier in adults presenting with numerous prior diagnoses or existing diagnoses such as personality, anxiety, or mood disorders. Mental health assessments should form an integral component of clinical care with regular screening, evaluation, and treatment done as part of ongoing support for autistic adults, rather than treating psychiatric conditions in isolation.

420.007 (Poster) Perception of Parents of Adults with Autism Spectrum Disorder Regarding Their Quality of Life and That of Their Child
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Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that affects the quality of life of parents, through the special needs of the child, the level of help required and the severity of symptoms. Similarly, ASD also affects the quality of life of the person with the disorder. Since most adults with ASD remain dependent on others to meet their needs, their quality of life depends on the people who provide support.

Objectives: The objective of this study is to analyze how parents of adults with ASD perceive their quality of life and that of their adult child.

Methods: The sample is composed of 20 parent-child dyads with ASD. The parents are mostly mothers and are on average 24 years old. A socio-demographic questionnaire as well as two questionnaires, namely the Scale of quality of life for parents of a child with ASD and the Scale San Martin – Evaluation of the quality of life of people with special needs, were completed by the parents. The first questionnaire focuses on the impacts of the ASD diagnosis on seven aspects of the parents’ quality of life: daily activities, professional relationships, social relationships, family and couple relationships, the relationship with the child with ASD, psychological well-being and personal development. The second questionnaire assesses the quality of life of adults with significant impairments according to eight quality of life components: self-determination, emotional well-being, physical well-being, material well-being, rights, personal development, social integration and interpersonal relationships.

Results: Results showed that 24.6% \( (n = 298) \) of participants reported at least one previous psychiatric diagnosis that was perceived as a misdiagnosis before receiving an autism diagnosis. Gender differences in perceived misdiagnoses were explored using logistic regression. A sample of 1211 autistic adults (52.6% women, mean age 42.26 years) was evaluated.

Conclusions: The findings suggest that there is a high frequency of perceived misdiagnoses across a range of psychiatric conditions, with significant gender differences observed specifically in relation to personality disorders, anxiety, and mood disorders. Mental health assessments should form an integral component of clinical care with regular screening, evaluation, and treatment done as part of ongoing support for autistic adults, rather than treating psychiatric conditions in isolation.
Background: Despite having many strengths, autistic adults often experience challenges in obtaining and maintaining employment (Scott et al., 2019). Thus, development of interventions to support autistic employment has become a burgeoning research area. One such intervention, PEERS® for Careers, adapts evidence-based methods to teach employment-related social skills (Moody et al., 2022). Although PEERS® for Careers produces significant benefits in autistic employment outcomes, autistic heterogeneity and intersectionality (Georgiades et al., 2013) require investigation into moderators of treatment response to ensure equity and inform individualized treatment planning. This is especially important given the wide use of career coaching as an intervention component for autistic adults (Kim et al., 2022).

Objectives: This study aimed to explore predictors of treatment response following PEERS® for Careers, focusing on participant and career coach characteristics.

Methods: Participants included 106 autistic adults (Mage=22.9, SD=3.6; 81% male; 49.1% White) with cognitive abilities in the average or above average range (IQ³85). Following enrollment in PEERS® for Careers, 53 young adults were randomly assigned to receive a career coach, who included undergraduate and graduate students who supported participants’ practice and application of employment skills. Participants and coaches completed demographic and employment surveys, as well as the Test of Employment Social Skills (TESS; Moody et al., 2022) pre- and post-intervention. Participants were administered the Wechsler Abbreviated Scales of Intelligence, 2nd Edition (WASI-II; Wechsler, 2011) and Social Responsiveness Scale–Second Edition, self-report (SRS-2; Constantino & Gruber, 2012).

Results: After the 20-week PEERS® for Careers program, participants showed greater engagement in employment activities and significant increases in employment-related social skills knowledge (TESS), feelings of preparedness for employment, and social responsiveness (p=.01), with the Coach group demonstrating greater improvements. Young adult race, gender, age, and cognitive ability did not significantly predict treatment response on any outcome measures. Similarly, baseline social responsiveness did not predict employment-specific outcomes. However, those with greater baseline impairments on the SRS-2 did show greater improvements in social responsiveness post-treatment, p=.001. Participants enrolled in college also showed significantly greater gains on the SRS-2, p=.031, and a marginal greater likelihood of gaining paid employment from pre- to post-intervention, p=.067, when compared to those not in college. With respect to coach characteristics, neither coach age, employment-related social skills knowledge, nor paid employment history emerged as significant predictors of young adult treatment response. However, coaches’ own feelings of preparedness for employment at baseline significantly predicted positive changes in young adults’ social responsiveness, p=.013, and had a trending association with obtaining of employment/internships, p=.059. Forthcoming analyses will explore these characteristics as predicting ongoing success at 10- and 20-week follow-up assessments.

Conclusions: Findings generally indicate that PEERS® for Careers improves employment-related outcomes similarly for autistic adults across multiple diversity dimensions. Only enrollment in college marginally differentiated employment outcome post-intervention, suggesting that young adults’ postsecondary experiences may further expand job opportunities and success. Additionally, although career coaches added significant benefit beyond the didactic curriculum alone, only coach feelings of preparedness for employment related to young adult treatment response.

Background: Autistic youth who graduate high school with a regular diploma are afforded with opportunities such as acceptance to post-secondary education and employment that requires a high school diploma. Yet, little is known about the outcomes of this population, and the predictors of those outcomes. We focused on identifying malleable factors in high school that predicted post-school outcomes in this population.

Objectives: In this study we examined the extent to which emotional wellbeing, executive functions, and the ability to self-manage daily life tasks were associated with young adult outcomes in autistic youth who recently graduated high school with a diploma.

Methods: Participants were parents and 36 autistic diploma-track youth (ages 17-20) who completed measures during the last year of high school (T1) and approximately 14 months after youth high school graduation (T2) (see Table 1). Measures included the Pediatric Evaluation of Disability Inventory – Computer Adaptive Test – ASD version (PEDI-CAT-ASD; Haley et al. 2012), the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1994), the Behavior Rating Inventory of Executive Function, Adult (BRIEF-A; Roth et al., 2005), and a researcher-developed measure of post-school outcomes that summed objective and subjective (satisfaction) indicators in 3
domains: productivity (employment or post-secondary education), social well-being (frequency of contact with friends), and living situation (autonomy). Outcome indicators were developed using items from the Adult Behavior Checklist (ABCL; Achenbach & Resclora, 2003), the Adult Self-Report (ASR; Achenbach & Resclora, 2003), and items developed by the research team.

Results: Number of youth positive post-school outcomes ranged from 2 to 6; one-quarter of the sample had positive outcomes on all 6 indicators. Bivariate correlations indicated that a higher number of positive post-school outcomes at T2 was associated with the following at T1: fewer depressive symptoms (youth report on the DASS; r = -.520, p = .002), better ability to self-manage daily life tasks (parent report on the PEDI-CAT-ASD; r = .463, p = .007), and fewer metacognitive executive function impairments (parent report on the BRIEF-A; r = -.392, p=.022). Parent reported youth social cognitive and self-care skills on the PEDI-CAT-ASD, and youth reported anxiety on the DASS, were not associated with post-school outcomes. In an ordinary least squares regression analysis, only DASS depression significantly predicted T2 post-school outcomes (see Table 2). The ability to self-manage daily life tasks and metacognitive executive function skills did not contribute additional unique variance to the prediction of T2 post-school outcomes.

Conclusions: The finding have important implications for high school supports and interventions for diploma-track autistic youth. Although the ability to self-manage daily life tasks and executive function skills were associated with positive post-school outcomes, depression symptoms were a stronger predictor. This suggests that attention to youth depression should be prioritized. The fact that youth social and self-care abilities, and anxiety symptoms, were not associated with post-school outcomes may be due to the unique nature of the sample and the fact that they had relatively stronger general cognitive and academic capabilities. Further research is needed to substantiate these findings with larger samples.

420.010 (Poster) Predictors of Depression in Autistic College Students

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Background: Research suggests that autistic college students report higher rates of depression than their neurotypical peers; however, the current literature on factors contributing to depressive symptoms in this population is limited (McLeod et al., 2020). Depressive symptoms have been shown to predict lower grade point averages; more classes dropped; and higher rates of classes, assignments, exams, and social activities missed (DeRoma et al., 2009; Hysenbegasi et al., 2005). With more autistic students attending post-secondary institutions, there is a demonstrated need to understand the factors contributing to depressive symptoms in this population, as depressive symptoms can adversely impact school performance and socialization (Shattuck et al., 2020).

Objectives: The present study explored the mechanisms behind depressive symptoms in autistic students at the start of college, including self-esteem and feelings of loneliness.

Methods: 21 college students aged 18-20 (M=18.48, SD=0.68; 81% male) were included in the current analysis based on involvement in a college support program for autistic students. Program requisites include documentation of an autism diagnosis, enrollment as an undergraduate at the university, and student-expressed desire to participate. Students can enter the program at any point during their undergraduate career. In accordance with an ongoing program review process, students completed various self-report measures including the Center for Epidemiologic Studies-Depression Scale (CESD: Radloff, 1977), Rosenberg Self-Esteem Scale (RSES: Rosenberg, 1979), and Revised UCLA Loneliness Scale (Russell et al., 1980). De-identified data from the first month of entry into the program was requested by the research team for analysis.

Results: Bivariate Pearson correlation indicated that self-esteem was negatively correlated with depressive symptoms, (r(19)=-.590, p<.05). Loneliness was not significantly correlated with depressive symptoms, (r(19)=0.185, p>.05). Self-esteem was negatively correlated with loneliness, (r(19)=-0.381, p<.05). Multiple linear regression revealed that 35% of the variance in depressive symptoms can be accounted for by loneliness and self-esteem (R²=0.35, F(2,18)=4.85, p<.05). Using a two tailed test (a=0.05), self-esteem significantly predicted depressive symptoms (β=-0.61, t(18)=-2.96, p<.01). Loneliness was not a significant predictor of depressive symptoms (β=-0.05, t(18)=-0.23, p>.05).

Conclusions: Findings indicate that lower self-esteem is predictive of increased depressive symptoms in a sample of autistic college students. Notably, loneliness did not significantly correlate with or predict depression; however, loneliness was negatively correlated with self-esteem (i.e., more feelings of loneliness were associated with lower self-esteem). This analysis has implications for how to best support autistic college students who experience symptoms of depression when they first transition to university life. It appears that prioritizing autistic students’ self-concept and promoting confidence may be a more effective point of intervention than increasing amount of social contact. Relative to social interventions, there are myriad of possible neurodivergent-affirming avenues to increase self-esteem (e.g., strengths-based approaches, positive autistic identity development). Further, this study provides support for the integration of resources or exercises that increase autistic students’ self-assurance into college support programs. Future work will examine self-esteem and loneliness as predictors of depression at a later timepoint in the college support program, and after additional time on the university campus, to assess potential longitudinal changes.

420.011 (Poster) Predictors of Knowledge and Functional Skill Acquisition Using the “Teaching Model” in Adults with Profound Autism
Background:

Very few studies have examined intervention programs aimed at advancing academic and functional skills among adults with profound autism. Research in intellectual disability suggests possible progress in these domains even at older ages. In a previous study, we described an innovative intervention, the Teaching Model (TM), which transmits academic and functional skills to adults with profound autism in a classroom setting. We found the TM to be an effective continuing education intervention for both acquiring new knowledge and for improving functional skills consisting of social communication, adjusted behaviors, and independent skills related to the classroom setting. Identifying factors that predict the outcome of this intervention was the focus of the current study.

Objectives:

- To identify predictors-including demographic variables (age, gender), autism severity, adaptive skills, and maladaptive behaviors-of better acquisition of new knowledge through using the TM, among adults with profound autism.
- To identify predictors from among the previously mentioned variables of better acquisition of functional skills.

Methods:

The study included 86 participants (males=61; females=25) with an age range of 22.6-57.6 years (M=34.8, SD=8.7 years). The participants were previously diagnosed with autism based on their medical records, and currently live and work in sheltered frameworks for adults with profound autism. All the participants were evaluated for autism severity utilizing the Social Responsiveness Score (SRS), and for adaptive skills and maladaptive behaviors utilizing the Vineland Adaptive Behavior Scales (VABS). The participants were enrolled in TM courses on the topics of music, photography, recognizing emotions, gardening, and geography. Topics and functional skills were taught and practiced in small groups of 2-4 participants for one hour twice a week for four months using applied behavior analysis strategies. Outcomes of the TM were assessed by two measures designed for this research, including knowledge examination of the teaching topics and assessment of functional skills. Data were collected before (T1) and after the TM intervention (T2).

Results:

To identify predictors of better acquisition of new knowledge and functional skills through using the TM, two hierarchical linear regression analyses were performed. Age, gender, autism severity (SRS subscale scores), adaptive skills and maladaptive behaviors (VABS), were used as the independent variables. For better acquisition of functional skills (T2-T1), the model explained 21.1% of the variance. Better acquisition of functional skills was associated with low SRS social communication and interaction subscale scores (β=-.43, p<.001), older age (β=.25, p<.05), and male gender (β=.23, p<.05). For better acquisition of new knowledge (T2-T1), the model was not found significant. Nevertheless, age was the only independent variable that correlated significantly with better acquisition of new knowledge (r=0.25, p<.01).

Conclusions:

Less severe social communication impairments, older age, and male gender predicted better outcomes in functional skill acquisition. In addition, there was a significant correlation between age and knowledge acquisition. The major role of age in both outcome measures raises the possibility of the compensation age theory described in the intellectual disability field. This suggests there may be a window of opportunity for learning new skills even at older ages among those with profound autism.

420.012 (Poster) Prevalence of Anticholinergic Medication Use in Middle-Aged and Older Autistic Adults and Associations with Self-Reported Memory Problems and Self-Reported Cognitive Decline


Background: Anticholinergic (AC) medications block action of acetylcholine at cholinergic receptors in the central and peripheral nervous systems. Many commonly used prescription and over-the-counter medicines have potent AC effects. Among older adults, AC medication use is associated with acute and chronic cognitive impairment, and elevated risk for delirium, dementia, mild cognitive impairment, and Alzheimer’s Disease. Collectively, associations of AC medications with cognitive problems are referred to as anticholinergic cognitive burden (ACB). Because of high rates of co-occurring medical and psychiatric conditions across the lifespan, autistic individuals may...
have high AC exposure, and thus, may experience elevated risk for ACB. Nevertheless, no research has characterized AC exposure or examined its associations with cognitive outcomes in autistic adults.

Objectives: Characterize AC medications; Document concurrent associations between AC medications and self-reported memory complaints; and Examine if AC medications at Time (T1) predict self-reported cognitive decline at T2 in middle-aged and older autistic adults.

Methods: Autistic adults (40-83y) were recruited via SPARK’s Research Match. At T1, 415 participants reported their current prescription and over-the-counter medication. Medications were coded using the CRIDECO Anticholinergic Load Scale, which classifies AC potency as follows: 1=low, 2=moderate, 3=high. ACB was characterized in two ways: total ACB score, and ACB≥3, a cut-off identified as clinically meaningful. 382 participants self-reported memory problems via the Prospective and Retrospective Memory Questionnaire (PRMQ). Two hierarchical linear regression models examined associations of ACB with PRMQ total score, with birth-sex and age entered in the first step, and either ACB total score or ACB≥3 entered in the second step. At T2, a subset (N=197) of T1 participants self-reported on cognitive decline via the Eight-item Interview to Differentiate Aging and Dementia (AD8). Logistic regression models were run using the AD8 cut-off of ≥1 (recommended cut-off for the self-report AD8) and separately ≥2 (a conservative cut-off) as dependent variables, with birth-sex and T1-age entered in the first step, and either ACB total score or ACB≥3 in the second step.

Results: Table 1 presents sample characteristics. A high proportion (62.7%) of autistic adults reported taking at least one AC medication. This contrasts with ~20-50% of U.S. adults >65y taking at least one AC medication. Further, 26% of autistic adults reported ACB≥3. Hierarchical regression modeling revealed that after controlling for age and birth-sex, both concurrent total ACB and ACB≥3 predicted more self-reported memory problems (Table 2). Logistic regression modeling showed that, after controlling for age and birth-sex, higher total ACB at T1 predicted self-reported cognitive decline at T2 using the AD8≥1 cut-off.

Conclusions: This is the first study, to our knowledge, to characterize AC medications and associations with cognitive problems in autistic adults. Participants here (M=52.0y) were younger than those in most prior ACB studies of non-autistic adults (>65y). AC use and vulnerability to the negative effects of AC medicines increases with age; thus, high AC medication rates and associations with cognitive problems in this relatively young sample is concerning. Understanding ACB—including potentially earlier AC polypharmacy—and its impacts on cognition (e.g., dementia risk) in autistic adults is warranted.

420.013 (Poster) Prevalence of Common Medical Co-Morbidities of Adults with Autism Spectrum Disorders (ASD) at Selected Centers in Bangladesh

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Background:

Autism spectrum disorder (ASD) encompasses a heterogeneous group of individuals with early childhood onset of deficits in social interaction and language development, a restricted repertoire of interests and activities, cognitive skills ranging from severe deficits to high functioning individuals. Medical conditions that have been shown to be significantly more prevalent in those with autism spectrum disorders than the general population.

Objectives:

General objective:

To observe the prevalence of different medical comorbidities among adult ASD persons at selected centers in Dhaka, Bangladesh.

Specific Objectives:

1. To evaluate present medical problems from parents by history taking, physical examination and personal medical records of particular ASD person.
2. To verify the status of medical problems by doing necessary investigations.
3. Evaluation of the Socio-economic & demographic condition of the family having diagnosed ASD adult with comorbidities.

Methods: This was a cross sectional study. Data were collected from selected centers of Dhaka, where adult ASD (age range: 18-47 years) persons regularly visit for vocational training, therapies and intervention of Autism. 44 participants were included in this study.
Results:
There were different kinds of medical co-morbidities present among the participants. Hypercholesterolemia was present in most (25%), followed by anemia in 13.8%, Diabetes Mellitus in 9.1%, Seizure disorder in 9.1%, insomnia in 6.8% and hypertension in 2.3%

Conclusions:
There were multiple medical co-morbidities present among adult ASD persons. But very limited researches were done about that. It would be necessary to find out the medical co-morbidities among them. There are limited data on medical co-morbidities among adults with ASD. Further large scale multi-center study will be needed to find out the cause and plan for the treatment.

420.014 (Poster) Psychological and Behavioral Profiles in Autistic Adults Who Self-Identify As Gender- and Neurodivergent

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Background: Autism and related conditions have continued to rise in recent years as have the number of people who identify as gender-divergent. Those who are autistic/neurodivergent and gender-divergent are underrepresented, and less is known regarding the diagnostic complexities associated with gender diversity in the autistic population.

Objectives: The purpose of the current study is to better understand psychological/behavioral profiles in autistic adults who identify as neurodivergent alongside different aspects of gender identity. Specifically, we sought to identify factors related to cognition, social functioning and behavior, psychopathology, and sensory symptoms alongside gender constructs.

Methods: Data collection is ongoing (target \( N = 50 \)) however the current study provides a preliminary report on 11 adults who identify as autistic and gender-divergent between 18 and 35. Participants were adminisetred the Autism Quotient (AQ), the Genderqueer Indentity (GQI) scale, the Camouflaging Autistic Traits Questionnaire (CAT-Q), the Adult Repetitive Behaviour Questionnaire-2A (RBQ-2A), the Millon Clinical Multiaxial Inventory- Fourth Edition (MCMI-IV), the Adult/Adolescent Sensory Profile (A/ASP), and the Reynolds Intellectual Assessment Scales, Second Edition (RIAS-2).

Results: Of the preliminary sample (\( N = 11 \)), ten were assigned female at birth and one was assigned male. Six participants identified as non-binary, three female, and two selected “other/prefer not to say.” The subscales on the GQI including Social Construction, Gender Fluidity, Challenging the Binary, and Theoretical Awareness were all significant for associations with autistic symptoms. The mean AQ score (M=34.81, SD= 4.54) of the sample group was above the score threshold observed in those with clinical features of autism. The CAT-Q Compensation, Masking, and Assimilation scales were above the neurotypical score cutoff, as were RBQ-2A scores across both Repetitive Sensory-Motor Behaviors and Insistence on Sameness. RIAS-2 scores for verbal abilities (M=117.54, SD=4.99) were elevated in the sample as compared to non-verbal abilities (M=107.92, SD=11.2) and overall Composite IQ (M=113.99, SD=9.99). On the A/ASP, the sample reported significance on the Sensory Sensitivity and Sensory Avoiding subscales. Elevations on the MCMI-IV included Avoidant (M= 77.27, SD=22.00) and Anxious scales (M=80.36, SD 12.58).

Conclusions: The results of the current study are suggestive of diagnostic complexities associated with the female and gender diverse populations. There is clinical need for awareness of the distinguishing ASD factors within these populations, including sensory challenges, social behaviors such as camouflaging, anxious, and potentially avoidant behaviors. While these results should be considered within the small sample size, they help support our understanding of diagnostic tools and their detection and utility.

420.015 (Poster) Quality of Life and Coping Strategies for Activities of the Daily Life Among Young Adults with Autism Spectrum Disorders: A Mixed-Methods Study

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Background:
Quality of life is a multidimensional construct that includes the domains of emotional well-being, interpersonal relationships, material well-being, personal development, physical well-being, self-determination, social inclusion, and rights, including work. Several studies have reported a lower quality of life in people with Autism Spectrum Disorder (ASD) compared to those without ASD, especially in the domains related to social relationships and integration. Thus, lower employment rates have also been reported in this group. There is little literature regarding coping strategies in young adults used for activities of daily living, including work, and their relationship with quality of life.

Objectives:
To explore the perception of quality of life and its relationship with coping strategies used by young adults (16-30 years) with ASD for activities of daily living, including work.

Methods:

A qualitative and quantitative study design is being conducted to analyze barriers and facilitators of labor inclusion and factors associated with employment rates in young adults with ASD. In this study, we analyzed a subset of data, in two regions of Chile, through a mixed methods design. For the quantitative analysis, questions from the disability and health module of the Chilean National Health Survey 2016-2017 were analyzed (n=22). Descriptive statistics were used to summarize data points.

Additionally, we conducted 25 in-depth interviews with subjects diagnosed with ASD. For this, all the information collected was digitalized and transcribed, creating a unique corpus of data. Then, an open coding process was conducted, using ATLAS.ti, enabling the assignment of units of meaning to the information and the construction of categories. During the analysis process, the principles of Glaser and Strauss’s Grounded Theory.

The ethics committee of the Universidad de O'Higgins approved the project. All safeguards were considered to guarantee confidentiality in the handling of information.

Results:

Information from 22 young adults who completed the survey were analyzed, 50% women and a median age of 22 years (Range 18 to 28). Of them, 83% reported feeling good or very good about their life (with their work, family, well-being, health, and close relationships). Most (81%) reported not having problems with personal care; however, 62% had difficulties performing their usual activities, including working, and a high percentage referred to requiring any level of support (41%). By triangulating this information with the qualitative analysis categories, it is observed that the participants developed coping strategies that allow them to face the difficulties of daily life, such as acting strategies for everyday life, and preparing scenarios and routines.

Conclusions:

It seems that the quality of life of the study participants was not worsened despite reporting difficulties in activities of daily living and requiring support, which might be related with personal coping strategies or working with the help of professionals from early stages of life. The results suggest that in young adults with ASD, the support received is valued positively and facilitates integration into school and workspaces.

420.016 (Poster) Repetitive Thinking in Relation to Cognitive Flexibility and Processing Speed

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Background: Repetitive thinking has been associated with depressive symptoms in autistic adults (Gotham et al., 2018), just as it is in the general population, and may represent a treatment target for improving mental health interventions for autistic adults. Repetitive thinking may be a form of autistic repetitive behavior related to cognitive inflexibility, as both constructs share an element of difficulty shifting cognitive focus. Autistic stakeholders who agreed to review our study design in a community engagement group stated that they believed their repetitive thinking functioned to make sense of information in the context of slower cognitive processing speeds.

Objectives: The present study investigates the associations between self-reported repetitive thinking – both that which is actively focused on meaning-making (reflective), as well as passive, negatively-focused brooding – and cognitive flexibility and processing speed. We hypothesize that participants who report greater passive brooding will display lower cognitive flexibility on a National Institute of Health (NIH) Toolbox iPad task, and those who report greater reflective repetitive thinking will display lower processing speed on a related Toolbox iPad task.

Methods: Our sample included N=130 adults aged 18-45 (M=26.85, SD=7.35), including autistic (n=57), non-autistic depressed (n=33), and adults with no history of autism or depression (n=40). Our sample identified as 34.6% men, 52.3% women, 8.5% non-binary/other, with the remainder choosing not to respond. We used the Ruminative Response Scale (RRS) Brooding and Reflection subscales (Treynor et al., 2003) to operationalize repetitive thinking variables, and standard scores from the NIH Toolbox.
Response to Conversational Bids in Autistic, Loss of ASD Diagnosis, and Neurotypical Individuals: Latency and Perceived Quality


Background: Conversation entails a complex range of skills, including openings, topic maintenance and shifting, and turn-taking. Autistic individuals tend to produce higher rates of “empty turns” (i.e., lack of responses where responses are expected; Eales, 1993), and take fewer conversational turns than neurotypical (NT) peers (Paul et al., 2009). Delays in turn-taking can elicit negative emotions in conversational partners (Kroodenburg, Postmes & Gordijn, 2013). Much of the existing literature on turn-taking in autism spectrum disorder (ASD) examines the frequency of conversational turns; less work has explored qualitative features of turn-taking such as latency between a conversational bid and a response. One study reported longer turn-taking gaps during the ADOS-2 in Japanese-speaking autistic males compared to NT peers (Ochi et al., 2019), apparently impacting social impressions. Some individuals diagnosed with ASD in childhood do not meet diagnostic criteria by adolescence; they have “lost the ASD diagnosis” (LAD; Fein et al., 2013). Our group has extensively characterized language skills in LAD.

Objectives: The current study assessed latency and perceived quality of responses to conversational bids in LAD, autistic, and NT adolescents and adults.

Methods: Graduate clinicians assessed fifty-two participants from LAD, ASD, and NT groups with age-appropriate cognitive and language skills using the ADOS-2, Module 4 in an online protocol (Eigsti et al., 2022); Table 1. Examiners presented 3-4 overly-vague conversational bids (“I saw a great movie last week”). Coders naïve to diagnosis calculated response latency as the interval from bid offset to the participant’s response, and assigned a quality rating using a 1-4 rating scale, based on nonverbal behaviors and perceived interest and sincerity of response. Coders reached 80% or better reliability on all variables.

Results: There were no group differences in latency. The NT group’s responses received a higher quality rating than for the autistic group; the LAD group’s rating did not differ from either group. A generalized linear model (GzLM) suggested that latency was unrelated to group, age, or verbal IQ; Table 2. Similarly, a GzLM examining quality ratings suggested no effects of group, age, or verbal IQ. Latency approached significance as a predictor of response quality in a GLM. Latency and response quality were significantly and negatively correlated (Spearman’s $\rho = -.31, p = .03$), such that longer delay before a response was associated with a lower response quality rating. ADOS-2 total scores were negatively correlated with quality ratings (Spearman’s $\rho = .53, p < .001$).

Conclusions: Response latency (approximately 1 second) to conversational bids during the ADOS-2 was equivalent across ASD, LAD, and NT youth. The LAD group’s perceived response quality did not differ from either group, suggesting they may have a social style that is intermediate between the ASD and NT groups, though the range was small. Although latency did not differ across groups, results suggest that longer latency is associated with poorer perceived quality of social responses. Next steps are to investigate the specific contributors to perceived quality of conversational bids (i.e., facial expressions, gestures), and how these behaviors differ across groups.
**420.018 (Poster) Resting Heart Rate Variability and Camouflaging As Predictors of Sensory Function in Autism Spectrum Disorder**


**Background:**

Autism spectrum disorder (ASD) is characterized by impaired social communication and repetitive/stereotyped behaviors. Often, individuals with ASD engage in camouflaging to compensate for or mask autistic characteristics during social interactions to minimize the visibility of their autism in social situations. Additionally, atypical sensory function and anxiety are often observed in ASD. Changes in heart rate variability (HRV), or the normal variation of time between consecutive heartbeats, have been linked to anxiety as well as social and communication impairments seen in ASD. However, the relationship between camouflaging and these other aspects is not known. Understanding the relationship between camouflaging and HRV to predict sensory function may better inform diagnostics and treatment of those with ASD.

**Objectives:**

This study explored how resting HRV or/and camouflaging predict sensory function in ASD. We hypothesized that resting HRV variables and camouflaging would correlate with sensory function score in ASD.

**Methods:**

Twelve young adults aged 19-26 with a diagnosis of ASD participated in the study. Time- and frequency-domain HRV was calculated from five minute resting electrocardiogram recordings. Sensory function was assessed in four domains: low registration, sensation seeking, sensory sensitivity, and sensation avoiding, as assessed by the Adult Sensory Profile (ASP). The Camouflaging Autistic Traits Questionnaire (CAT-Q) was used to assess three camouflaging domains: compensation, masking and assimilation. Multiple linear regression analyses were performed with GraphPad Prism 5.0. The correlation was considered to be significant at \(p<0.05\).

**Results:**

HRV in the frequency domain (VLF Power) and camouflaging (compensation and assimilation) were significantly positively correlated with sensory function. Furthermore, the compensation scores on the CAT-Q were significantly positively associated with sensory sensitivity on the ASP, while assimilation scores on the CAT-Q and VLF power (HRV) were significantly positively associated with sensation avoiding on the ASP.

**Conclusions:**

Among the HRV variables, the frequency domain variables (VLF Power) markers of arousal states and camouflaging were found to correlate with sensory function in ASD. One potential explanation is that VLF rhythm activity is generated by the heart intrinsically due to physical activity and anxiety that modulate its frequency and amplitude. Therefore, this may represent a marker for a relationship between anxiety and camouflaging. Furthermore, sensory function aspects (sensory sensitivity and sensation avoiding) were associated with camouflaging (compensation and assimilation), respectively. Subsequent work will need to explore the mechanisms by which increased sensory reactivity are associated with camouflaging. Our results suggest that sensory function, arousal, and camouflaging are interrelated in ASD. Future work is needed to better understand these relationships.

**420.019 (Poster) Restricted Repetitive Behaviors Among Adults from the SPARK Cohort: Rates and Correlates**

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**Background:** Restricted and repetitive behaviors (RRB) are one of the two core domains that define autism spectrum disorders (ASD). Yet, they have been relatively understudied, especially among adults.

**Objectives:** 1) to provide descriptive data on the prevalence of RRBs in a large sample of adults with ASD recruited in the SPARK national research cohort; 2) to examine correlates of RRBs in this large sample.
Methods: We used the SPARK data released in June 2022 by SFARI (https://www.sfari.org/resource/spark/). RBS-R data were available on 2,764 dependent adult participants, ages 18 to 32 (78.0% males; mean age: 22.2 years (SD=3.64)), and had been completed by their caregivers. Data on socio-demographic, medical, psychiatric, developmental, clinical correlates were extracted from other questionnaires completed at registration in SPARK by the caregivers.

Results: Almost two thirds (63.5%) of participants received their diagnosis before age 6, and a negligible fraction (4.4%) at or after age 18; 31.1% were minimally verbal. Almost half (46.2%) the sample had been diagnosed in his lifetime with intellectual disability (ID). Persistent language deficits were reported in 31.2% of the sample. Prevalence of comorbid psychiatric disorders was high (anxiety disorders: 42.1%; ADHD: 39.8%). The prevalence of the 43 RRB problems (of any severity level) ranged from 10.6% to 81.8% (median: 42.0%), and 21 items showed significant sex differences. Items more prevalent in males mapped on the Stereotyped and Restricted Behavior Subscale with 4 from the 6 items showing significantly higher scores in males. Items more prevalent in females loaded on the Self-Injurious Behavior subscale (with 4 from its 8 items showing higher scores in females) and the Sameness Behavior scale (with 5 of its 11 items showing higher scores in females). However, there was no significant sex difference for the RBS-R total score (p=.12). Increasing age was associated with a significant decline in 4 subscale and the total RBS-R scores. In bivariate analyses using the total RBS-R score as the dependent variable, socio-demographic (participant’s age, sex, race and ethnicity, maternal education, household annual income) and clinical/developmental characteristics (lifetime diagnosis of cognitive impairment, presence of a birth defect, prematurity at birth, prior language regression, current language level, comorbid ADHD, comorbid anxiety disorder, sibling recurrence of ASD) were associated with significant (p<.05) differences in mean RBS-R score in adulthood. Multiple regression analysis yielded a significant model (F=40.4, df=10; p<.001) with all aforementioned predictors significantly explaining variance in the RBS-R scores, with the exception of sibling recurrence, and after adjustment on socio-demographic background factors. The most significant predictors were current language deficits, a co-occurring diagnosis of anxiety and of intellectual disability.

Conclusions: In this large sample of dependent adults, RRBs were highly prevalent, slightly decreasing with older age and showing no consistent sex difference. Predictors of RRBs were current severity of ASD (as indexed by language and cognitive delays), psychiatric comorbidity (especially anxiety), and indicators of early abnormal prenatal and perinatal development (birth defects and prematurity). Our next step is to examine if levels and types of RRBs map onto specific genetic variation using SPARK exome sequencing data.

420.020 (Poster) Risk of Somatic Conditions and Mortality in Autistic Adults
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Background:

Autistic adults are at increased risk of various health conditions and premature mortality. However, there are few population-based studies and most prior studies have employed a cross-sectional study design, which cannot ascertain direction of effects and may have inadequately adjusted for confounding. This current research focuses on somatic conditions of major public concern across the adult lifecourse. We used nationwide longitudinal data and employed population-based cohort and sibling study designs.

Objectives:

1. To assess the relationships between autism and major somatic conditions and premature mortality
2. To assess sex differences and differences by presence of intellectual disability in these relationships
3. To account for the influence of potential unobserved confounding using a sibling study design
4. To estimate absolute risks for public health utility

Methods:

Individuals born between 1940-1990 were selected with entry into the follow-up period (1969-2016) from 18 years of age. Data were from the Swedish Patient, Cause of Death, and Cancer registers. Exposures were: autism diagnosis (versus no autism), autism +/- intellectual disability (ID, vs no autism or ID). The ten outcomes of interest were: dementia, Parkinson’s disease, epilepsy, ischaemic heart disease, stroke, type 2 diabetes mellitus (T2DM), colorectal cancer, lung cancer, fractures and all-cause mortality. Covariates were: birth year, sex and parental educational level. Statistical analysis involved multivariable Cox regression. We repeated analyses, stratifying by sex and using the autism +/- ID exposure. Cox regression with stratification by family id was performed for the sibling analysis, with the autism diagnosis exposure. We used Royston-Parmar survival models to estimate absolute risks and risk differences at age 50.
Results:

There were 4,854,032 individuals in the national cohort analysis, with 26,707 (0.55%) individuals with an autism diagnosis. In the sibling analysis 46,988 individuals were included, with 18,197 autistic individuals. Autism was associated with elevated risks of dementia, epilepsy, Parkinson’s disease, stroke, T2DM, fractures and all-cause mortality (aHR range: 1.25-7.71). The largest effect sizes were for neurological diseases. Sibling analysis estimates were similar in direction and magnitude of effects, indicating little effects from unobserved confounders not shared by siblings (aHR range: 1.23-6.75). There was increased risk of epilepsy, fractures, and all-cause mortality in those autism + ID. Regarding sex differences, there was increased risk for autistic females compared to autistic males for fractures, T2DM and all-cause mortality. While the risks of neurological disorders (e.g. dementia and Parkinson’s disease) were higher for autistic adults, these conditions were reasonably rare in absolute terms. Fractures, T2DM and epilepsy were common in autistic adults, but also common in non-autistic adults. Risk differences at age 50 were generally small in absolute terms, where observed.

Conclusions:

Applying robust study designs and longitudinal analytic methods to nationwide Swedish data, we find that autistic adults compared to non-autistic adults are at higher risk of many somatic health outcomes and mortality in adulthood. Differences by sex and ID status were also uncovered. This information could help researchers and clinicians understand the healthcare needs of autistic adults.

420.021  (Poster) Robust Decline in Self-Reported Autistic Traits Levels Among Autistic University Students – a Yearlong Longitudinal Study

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Background: Growing numbers of autistic university students have motivated more research examining the effects of attending university on this population. Previous research primarily examined well-being and functional indices (such as anxiety/depression or adaptive behavior) among autistic students enrolling in specialized support programs. However, changes in autistic characteristics were not examined

Objectives: In this study, we evaluated, over the course of an academic year, changes in university student autistic trait levels, considered a stable measure of phenotypic expression of autism, using the Autism Spectrum Quotient (AQ, Baron-Cohen et al, 2001). Additionally, changes in psychiatric symptoms (state/trait anxiety, social anxiety, depression, and obsessive-compulsive symptoms) were also studied

Methods: This longitudinal study included 24 neurotypically developed (ND) students with high levels of social anxiety symptoms (High SA), 30 ND students with low levels of social anxiety symptoms (Low SA), and 41 autistic students residing with an ND student peer mentor as part of participating in the university's integration support program. Self-report data were collected during the first semester of two consecutive academic years (T1, T2).

Results: The findings indicated a significant interaction between Group and Time, denoting a significant robust decline (2.9 SD) in AQ total score (overall level) of autistic traits at T2 from T1 among the autistic group and a moderate (.5 SD) decline in AQ total score at T2 among the high SA group. While autistic students reported a sharp decline at T2 from T1 across all AQ domains, the most prominent decline was in attention switching (see Figure 1). Among all three groups, a significant but relatively moderate reduction in state/trait anxiety (< .30 SD) was found, but no significant associations were evidenced between participants’ baseline (T1) levels of anxiety or depression and decreased AQ scores at T2. Only for autistic students were more compulsive symptoms at T1 associated with a lesser decline in AQ scores at T2, and their decreased AQ at T2 was negatively correlated with their year-end grade point average.

Conclusions:

These findings suggest that the autistic university students’ subjective experience of their autism traits may undergo a profound change when attending post-secondary education, and that autism traits, as tapped into by the AQ, may be more malleable than originally thought. Considering the sharp decline in attention switching found in this study, a possible interpretation is that elevated levels of social interaction elicited during one year’s participation in the university's integration program demanded more attention switching and, consequently, was followed by improvement in this attentional ability. Although changes in AQ levels were previously found to be positively correlated with altered anxiety levels among ND students (Kitazoe et al, 2015), this study finding suggests that a decline in AQ scores cannot be explained solely by a reduction in anxiety.

420.022  (Poster) Stress and Well-Being in Autistic Adults: Exploring the Moderating Role of Coping

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Background: Emerging studies have alluded to high levels of stress and frequent stressful encounters in the autistic adult population. The wider stress literature suggests negative associations between stress and psychological well-being, which is particularly relevant for autistic adults given the poor mental health and well-being frequently reported in this population. The use of approach-oriented (e.g., engagement coping) and avoidance-oriented (e.g., disengagement coping) coping strategies has been related to improved and reduced well-being respectively in autistic and non-autistic adult samples. However, a more in-depth examination of the role of these coping strategies in autistic adults, and the extent to which they may moderate the relationship between stress and well-being remains unknown.

Objectives: The aims of the study were to: 1) explore associations between perceived stress and well-being, and 2) examine the potential moderating (i.e., buffering or exacerbating) role of coping strategies on the relationship between perceived stress and well-being in a sample of autistic adults.

Methods: The sample consisted of 86 Australian-based autistic adults, aged 19-74 years, recruited through an online study. Using a multidimensional approach, perceived stress was measured using a composite stress score, an aggregate of broader general perceived stress (Perceived Stress Scale; PSS) and more specific stress over daily hassles (Daily Hassles Inventory; DSI). Correlation analysis was conducted to explore the associations between stress and well-being (Warwick Edinburgh Mental Well-being Scale; WEMWBS), while two moderation analyses were run to determine whether the stress-well-being relationship was moderated by use of engagement coping and disengagement coping strategies (Brief COPE).

Results: Stress was strongly negatively associated with well-being ($p < .01$). The first moderation analysis revealed that engagement coping had a significant effect on well-being both directly ($b = 0.57, p < 0.01$) and indirectly, through an interaction with stress ($b = 0.21, p < 0.05$). The second moderation analysis showed that disengagement coping only had a significant direct effect on well-being ($b = -0.76, p < 0.01$), with its indirect effect not reaching statistical significance ($p > .5$).

Conclusions: In addition to stress being inversely associated with well-being, we also found that only engagement coping was a significant moderator in the relationship between stress and well-being in our sample of autistic adults. These results suggest differential mechanisms under which engagement and disengagement coping strategies operate in the stress-well-being relationship. Specifically, engagement coping may have both a promotive (direct) and stress-buffering (indirect) role, while disengagement coping may have a risk (direct) role only. Implications in the design of coping supports include a focus on honing engagement coping strategies in autistic adults, where its stress-buffering role may be especially beneficial in the context of high stress. Relatedly, identifying both autistic adults currently experiencing high stress, as well as situations likely to invoke high levels of stress in this population would also be pertinent.

420.023 (Poster) What Autistic Adults Living in a Residential Facility Consider As Important Factors for Their Well-Being?

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Background: Few autistic adults live independently and most live either with their family or in some form of residential care. Although the built and social living environment are important components of quality of life, few studies have focused on the experience of autistic adults living in group home. Associated conditions are common in autism resulting in further challenges to understand their perspective about their well-being due to a lack of appropriate measures. Therefore, how can we use an inclusive approach to understand what autistic adults currently experiencing well-being due to a lack of appropriate measures. Furthermore, how can we use an inclusive approach to understand what autistic adults currently experiencing high stress, as well as situations likely to invoke high levels of stress in this population would also be pertinent.

Objectives: The purpose of this study is to capture first-person perspective of autistic adults with intellectual and language disability about their well-being in a specifically designed group home environment. Through an inclusive method, this project aims to understand the relationship between autistic’s well-being and the physical/social components of the living environment.

Methods: This study is currently conducted (data collection: September-November 2022) with 14 autistic adults (21-55 years; 8F:6M) living in an autistic-specific residential home. All participants have an intellectual disability (mild to moderate) and significant language limitations (from minimally verbal to understanding/using short sentences). Participants took part individually in 1) a walking interview in which each adult selected and commented 3 significant spaces of their home, followed by 2) a complemented semi-structured interview using visual support (e.g., pictures) and different output modalities (e.g. card-sorting). Walking and semi-structured interview focusses on 4 major domains: physical space, relational/social environment, emotional well-being, occupation/social participation. Coding scheme was used to capture verbal and non-verbal communicative acts (e.g. gaze orientation). A mixed (inductive and deductive) descriptive qualitative analysis of the content was done following a person-environment interaction model.

Results: Overall, the combined method (walking and complementary semi-structured interview) allows participants to share their experience, including for adults who are minimally verbal. Being in the home environment to contextualize questions/answers, using pictures and objects as well as different output modalities are all helpful methods to support understanding and answering. So far, 7 preliminary relevant key themes are identified by participants: 1) positive/negative appreciation of living spaces is strongly related to individual experience (e.g. activities/mood in the space); 2) more importance given to what the environment offers and less to the intrinsic characteristics (e.g. architectural features, furniture); 3) feeling safe at home (e.g. access to an individual secure place), 4) sensory issues, 5)
Social/relational environment (e.g. significant relationships with staff and co-residents); 6) social and emotional regulation (e.g. possibility of being alone or choosing who one is with); 7) individual specific interest as a lever for social participation.

**Conclusions:** This study is one of the first to highlight what autistic adults with intellectual and language disability consider to be important factors associated with their well-being in the context of living facilities, showing that physical, social and occupational components are important. This study shows that it is not only possible but imperative to consider autistic individuals views and experiences for designing homes with and for autistic adults.

**420.024 (Poster) Self-Determination Trajectories in High School and Post-School Community Participation in Autistic Young Adults**


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Background: Self-determination refers to an individual's causal agency in their lives. Self-determined individuals set and take action to achieve goals based on their interests and values. Opportunities to develop self-determination during the transition to adulthood are critical (Shogren & Wehmeyer, 2017). Promoting self-determination during transition has been found to support more positive post-school outcomes in adults with disabilities, such as employment and community participation (Shogren et al., 2015; Test et al., 2009). Few studies have examined longitudinal studies of self-determination and its impact on community participation from the perspective of autistic individuals.

Objectives: The present study examined trajectories of self-determination in autistic transition-aged youth from adolescence to young adulthood and relationships to community participation after high school.

Methods: Participants included 144 autistic adolescents and young adults (Mean age = 20.1 years, SD = 1.5 years). Self-Determination capacity and opportunity were measured using the AIR Self-Determination Scale Student and Parent reports across three-time points during high school and one post-high school time point (Wolman et al., 1994). Autistic young adults and parents completed the Adolescent and Young Adult Activity Card Sort (Berg et al., 2015) at the post-high school time point. The card sort directly assesses young adults' self-reported and informant-reported current and desired participation in educational, vocational, daily living skills, and social and recreational activities, and barriers for any desired activities. Parents also reported whether or not the autistic adult had a job or educational experience ever since exiting high school and completed the Scales of Independent Behavior-Revised as a measure of adaptive behavior. All growth models were estimated using MPlus Version 8. Fixed effects for linear and quadratic growth models were estimated for self-determination.

Results: A linear growth model best fit the data. At entry into the study, participants, on average, rated their self-determination capacity and opportunities as a 3.6, SE = .05. On average, participants reported a significant increase in self-determination over time. Specifically, students reported a .05-point increase in self-determination scores per year across the five-year data period (β = .52, p = .02). Self-determination trajectories were significantly associated with community participation in vocational activities. Having a higher self-determination score at entry into the study was significantly associated with the young autistic adult having a vocational experience at all since exiting high school (β = .35, p = .01). Autistic young adults who reported more significant gains in self-determination over time reported that they were currently participating in more vocational activities (β = .44, p = .02). Self-determination at entry in the study also significantly predicted parent-reported vocational skills as measured by the SIB-R (β = .28, p = .03). Self-determination trajectories were not associated with educational, daily living skills, or social and recreational activities.

Conclusions: Autistic self-reports of self-determination at entry into the study and gains in self-determination skills over time were associated with vocational activity participation and work-related adaptive behavior skills. Findings suggest that targeting self-determination in high school and earlier may support autistic transition-aged youth participating in vocational activities after they exit high school.

**420.025 (Poster) Sex Differences in Anxiety and Autism Symptom Severity Among Adolescents and Young Adults**


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Background: Autistic individuals are at higher risk of developing a co-occurring anxiety disorder or experiencing anxiety symptoms than non-autistic individuals (White et al., 2009). Current research is conflicted on if higher or lower autism symptom severity is associated with an increased risk of experiencing anxiety (Eussen et al., 2013; Oswald et al., 2016). In non-autistic populations, women experience greater anxiety than men (Gao, Ping, & Liu, 2020). In autistic samples, sex differences in anxiety have not been demonstrated in adolescents.
Sex Differences in Service Utilization and Internalizing Behaviors Among Adults with Autism in Latin America during the COVID-19 Pandemic


Objectives: The primary aim of this study is to examine sex differences in anxiety symptoms among autistic adolescents and young adults. We also examined whether the association between anxiety and autism symptom severity differed for transition-aged autistic males and females.

Methods: Participants (N=180, 72% male, 28% female) were individuals with a prior diagnosis of autism, ages 16-21 (average age = 18.4 years), who participated in a transition to adulthood intervention program (TEACCH School Transition to Employment and Post-Secondary Education Program; T-STEP). Prior to the intervention, participants completed the self-report State-Trait Anxiety Inventory, Trait Scale (STAI-T) and caregivers completed the Social Responsiveness Scale-2 (SRS-2). A linear regression was conducted to assess the moderating effect of autism symptom severity on the association between sex and anxiety in this sample.

Results: Levels of anxiety were high for both autistic males and females—on average, females reported anxiety in the 83rd percentile, and males reported anxiety in the 79th percentile. Multiple linear regression predicting rates of anxiety with sex and autism symptoms was significant (F(3, 176)=4.69, p<.004; Table 1). The R2 for the overall model was 7.4%, with an adjusted R2 of 5.8%. There were significant main effects of sex (b=.19, t(176)=2.55, p=.012) and SRS-2 Total Raw Score (b=.21, t(176)=2.44, p=.016), with females and individuals with higher autism symptom severity reporting higher levels of anxiety. The interaction between sex and SRS-2 was not significant (b=.10, t(176)=1.09, p=.28). These results indicate that in autistic transition-age youth, both sex and autism symptom severity uniquely predict anxiety (Figure 1).

Conclusions: Consistent with our predictions, transition-age autistic females experienced greater levels of anxiety than autistic males. Both males and females experienced high levels of anxiety, averaging in the 81st percentile. Across the sample of autistic transition-age youth, elevated autism symptoms were associated with increased levels of anxiety. Sex differences were not moderated by autism symptom severity. While the scatterplot of anxiety symptoms by autism symptoms (Figure 1) displays a potential interaction between sex and autism symptom severity on anxiety, it is not significant, which may be due to the smaller sample size in females. To better understand how to support autistic transition-age youth experiencing anxiety, future research is needed to explore sex differences in anxiety and the potential effects of autism symptom severity on anxiety levels in males.
There was an almost equal distribution of females (53.6%, n=30) and males (46.4, n=26). More than half of the sample (71.4%) had a diagnosis of Asperger syndrome, while 14.3% reported a diagnosis of autism spectrum disorder (ASD). There were no statistical differences between males and females regarding the type of diagnosis, country of residence, or age. The most commonly used service was medication (26%), with almost half of them (41.8%) maintaining the same medication plan. On the contrary, the least used services were speech therapy and sensory integration (1.8%). During the pandemic, 21.4% suspended services, 48.2% reported significant setbacks, 57.1% experienced an increase in negative mood, and 62.5% increased anxiety compared to pre pandemic. However, there were no statistical differences between males and females for any of these variables.

Conclusions:

Autistic adults living in Latin American countries experienced a significant increment in their internalizing behaviors (e.g., anxiety, mood, and regression) during the pandemic and decreased service utilization and medication. These results highlight the systemic and individual barriers to accessing therapeutic services in Latin America and, at the same time, shed light on how the pandemic has affected autistic adults in this region. In addition, we found no sex differences in internalizing and externalizing behaviors of autistic adults in Latin America during the COVID-19 pandemic, which supports previous reports of a similar prevalence of co-occurring disorders among autistic adults across sexes.

420.027 (Poster) Sexuality and Affective Life in Young People and Adults Diagnosed with Autism in Argentina. Descriptive Study Based in an Online Survey.


Background: Sexuality and intimacy are developmentally important and influence the health and quality of life of all people, including those with autism spectrum disorders (ASD). Research on how young people and adults with ASD perceive sexual and romantic relationships is scarce in Argentina and the Latin American region. This information is of great importance to help clinicians and families to make decisions regarding the need for supports and for risk prevention.

Objectives: To describe the supports, needs, and challenges regarding affective and sexual life in young people and adults with autism spectrum disorders in Argentina based on an online survey.

Methods:

An online survey was designed to investigate about affective life and sexuality in people with autism over 16 years of age living in Argentina.

The survey was structured into the following categories: 1) gender identity and sexual orientation; 2) access to information; 3) interest in social and romantic relationships; 4) Sexual and romantic experiences; 4) Barriers to access sexuality.

An exploratory analysis of the data was performed. Descriptive statistics such as mean values, standard deviation, and frequencies (absolute, percentage, and cumulative) were obtained. The responses were analyzed using Statistical Package Social Science, version 23.00 (SPSS 23.00)

Results:

156 people with a diagnosis of ASD between 16 and 55 years old (M = 30.76; SD = 9.23) completed the survey (66% female biological sex). 46.8% identified themselves as female, 32.7% male, 9% non-binary, and 2.6% transgender. Regarding sexual orientation, 47.4% defined themselves as heterosexual, 12.2% asexual, 12.2% bisexual, 8.3% pansexual, and 5.1% homosexual. Of the total number of respondents, 94% stated that they had social relationships, 77% reported having had at least one love relationship and 80.1% some sexual practice. Differences were observed in the proportion of responses by biological sex: 87.4% of female-biological-sex respondents reported having had an affair compared to 56.6% of the male biological sex.

The most relevant results are related to barriers: 75.7% of female respondents revealed having experienced a situation of risk or abuse, while among males it represented 35.8%. 78.6% of females reported that their sensory profile interfered with their affective or sexual relationships, while among males it represented 50.9%. In addition 61% of the whole sample indicated using "not very useful" strategies to approach other people in search of a love relationship.

Conclusions:
Sexuality and affective life in people with autism have not been systematically studied in Argentina. Our results are consistent with previous international studies regarding the report of positive sexual functioning and the desire to have social and loving relationships (Byers, 2013 et al.; Gilmour, et al., 2012), and the greater risk of sexual abuse and victimization in women within the spectrum (Sevlever, et al. 2013).

These preliminar results are relevant to guide future research that systematically explores sexuality in this population in Argentina. It is essential to count on reliable information to guide public policies to improve the quality of life of young people and adults with autism.

### 420.028 (Poster) Social Anxiety Symptoms in Autistic Young Adults: Comparing the Cognitive, Emotional, and Physiological Components of Emotion Regulation

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Background: Research suggests that autistic people engage in adaptive emotion regulation strategies less frequently (Samson et al., 2014), identity emotions less readily (Kinnaird et al., 2019), and exhibit increased physiological arousal (i.e., low HRV) (Cheng et al., 2020) compared to their neurotypical counterparts, all of which have been associated with anxiety symptoms (Cai et al., 2018; Moskowitz et al., 2013; Oakley et al., 2020). Prior research has primarily focused on autistic children or adolescents, and commonly relied on one method (i.e., self-report) to capture the multifaceted construct of emotion regulation (Conner et al., 2020). Additional multi-method research with autistic young adults is necessary for understanding how emotion dysregulation results in the manifestation of social anxiety during this critical transition period. The prevalence of social anxiety in the autistic population underscores the importance of this work (Spain et al., 2018).

Objectives: The present study utilized cognitive (i.e., use of suppression and use of reappraisal), emotional (i.e., alexithymia traits), and physiological (i.e., respiratory sinus arrhythmia (RSA) and heart period (HP)) measures to ascertain whether components of emotion dysregulation contribute to social anxiety in autistic young adults.

Methods: 63 autistic young adults ages 17-29 (M= 20; 18% female) completed self-report measures assessing usage of specific emotion regulation strategies (i.e., suppression and reappraisal) (ERQ; Gross & John, 2003), alexithymia traits (TAQ; Bagby et al., 1994) and symptoms of social anxiety (LSAS; Fresco et al., 2001). Physiological data were collected using a BIOPAC ambulatory heart rate monitor and electrocardiogram (ECG) electrodes. Participants sat quietly for three minutes to obtain baseline heart data. To calculate RSA, the Porges’ method was implemented with the CardioEdit and CardioBatch programs utilizing data from the frequency band representing spontaneous breathing in adults (i.e., .12-.40 Hz) (Porges, 1985; Riniolo & Porges, 2000). To calculate HP, successive interbeat intervals were averaged. Covariates of age and gender were included.

Results: Social anxiety symptoms were positively correlated with suppression (r(63)=0.39, p<.01) and alexithymia (r(63)=0.49, p<.001). Social anxiety was not correlated with reappraisal, RSA, HP, age, or gender. Backwards hierarchical regression revealed that suppression (β1=0.34, t(61)=3.07, p<.01), reappraisal (β2=0.35, t(61)=3.33, p<.001), and alexithymia (β3=0.42, t(61)=3.92, p<.001) significantly predicted social anxiety symptoms. This model accounted for 40.8% of the variance in social anxiety symptoms (R²=0.408, F(3,59)=13.58, p<.001).

Conclusions: Findings indicate that greater usage of suppression, less usage of reappraisal, and alexithymia traits are predictive of increased social anxiety symptomatology in autistic young adults. Notably, RSA and HP did not significantly correlate with or predict social anxiety symptoms. Possible explanations include the usage of baseline heart rate data or a small sample size. This multi-method research highlights the importance of the cognitive and emotional aspects of emotion regulation in the manifestation of social anxiety in autism. This study provides preliminary support for the prioritization of cognitive and emotion-focused therapies with a neurodivergent-affirming provider to support autistic young adults with social anxiety. Future research is needed to clarify the significance of the physiological aspect of emotion regulation for autistic young adults who experience social anxiety.

### 420.029 (Poster) Steering Control Differences Emerge during Curve Negotiation Based on Autistic Traits and Attention

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Background: Negotiating horizontal curves safely and effectively requires adept control of steering adjustment, speed, and lane positioning, as well as accurate perception of road segment curvature and adjustment to proprioceptive cues. As such, this maneuver requires heightened use of cognitive resources such as attention and executive function. Prior research has revealed differential performance in these cognitive functions in autistic individuals, as well in driving maneuvers involving steering and turning. This suggests that autistic drivers may differ in their curve negotiation strategies relative to their non-autistic counterparts.
Objectives: To examine the effects of dimensional autism symptoms and executive functioning on steering behavior during curve negotiation in a driving simulator environment.

Methods: Thirty-one licensed adolescent and emerging adult drivers ($N_{ASD} = 13$, $N_{TD} = 18$) matched on age ($M = 20.00; SD = 2.75$), gender ($N_{female} = 19$, $N_{male} = 12$), and IQ ($M = 105.97; SD = 16.12$) were recruited. Participants completed a 13-mile experimental drive containing one right curve and one left curve in a high-fidelity driving simulator. The Autism Spectrum Quotient (AQ) was used as a continuous measure of traits related to autism in both groups. Further, participants completed various measures of executive functioning (EF). For analysis, EF scores were reduced using a Principal Components Analysis (PCA). Generalized Estimating Equations (GEE) using a Poisson distribution were used to estimate the number of lane exceedances and steering reversals across curve segments for each curve individually. Predictor variables included AQ Sum Score and EF component scores, with driving experience as a covariate.

Results: PCA yielded 2 component scores, titled Inhibition and Information Processing and Selective and Divided Attention. Drivers who endorsed more autistic traits demonstrated greater difficulties in steering recovery and compensatory maneuvering compared those reporting fewer traits. Poorer attention capacity was related to increased likelihood of lane exceedances during typical curve negotiation, as well as reduced likelihood of using corrective steering maneuvers (i.e., fewer steering reversals) when needed.

Conclusions: Drivers who endorsed more autistic traits demonstrated greater difficulties in steering recovery and compensatory maneuvering compared those reporting fewer traits. Increased steering reversals and lane exceedances may put autistic drivers at a higher risk for run off road crashes during challenging curves. Findings have the potential to inform targeted driver education protocols for this population, as these data suggest that steering control may be largely implicated in challenges experienced by autistic drivers. Additional investigation is needed to discern if difficulties navigating complex driving situations are a function of challenges with motor planning and execution, differences in gaze patterns, visuomotor integration difficulties, and/or other underlying processes, as well as the extent to which degrees and types of complexity affect driving behavior among autistic individuals.

420.030 (Poster) Suicidal Ideation and Behavior Mediates the Relationship between Executive Functioning and Quality of Life for Transition-Age Autistic Youth


Background: Autistic advocates identify quality of life and mental health as leading research and clinical priorities. Many autistic teens and young adults report a lower quality of life and elevated rates of suicidal ideation and behavior (SIB). Scientists have identified executive functioning as a predictor of quality of life for autistic people. However, this literature has not addressed the possibility that observed relationships are in fact mediated by other key factors – in particular, SIB. In non-autistic populations, suicidal ideation and behavior are associated with both executive function and quality of life. SIB may be a critical driver of quality of life independent from executive functioning skills, or it may mediate the relationship. Illuminating how SIB interplays with executive function on quality of life outcomes is vital for determining which factors the field needs to intervene upon to improve patient-centered outcomes, such as quality of life.

Objectives: To determine the association between executive functioning and SIB with subjective quality of life ratings for transition-age autistic youth.

Methods: Participants included 161 autistic adolescents without an intellectual disability diagnosis (ages 16-19 years) who enrolled in an online study about independent transportation and driving. All caregivers completed a broad psychiatric screener that included items about executive functioning and SIB (Behavior Assessment System for Children, 3rd Edition), and adolescents completed the NIH PROMIS Global Quality of Life scale (7 questions). We conducted two path analysis models (executive function$\rightarrow$suicidal behavior$\rightarrow$quality of life; suicidal behavior$\rightarrow$executive function$\rightarrow$quality of life) and one model of two independent direct effects (executive function$\rightarrow$quality of life; suicidal behavior$\rightarrow$quality of life) with maximum likelihood estimation (Figure 1). Significance testing of mediation effects were complemented with estimates of indirect effect sizes using a 95% bootstrapped confidence interval (CI) based on 20,000 bootstrapped samples. CIs that do not contain zero indicate significant mediation.

Results: 22% of the sample endorsed SIB. SIB significantly mediated the relationship between executive function and quality of life ($p<0.001$, CI does not contain 0), but executive function did not significantly mediate the relationship between SIB and quality of life ($p=0.287$, CI contains 0). The model of two independent direct effects was also significant, but a lesser fit than the mediation model (Table 1).

Conclusions: This study meets the call of the autistic community to illuminate paths that contribute to lower quality of life in transition-age youth. Here, we establish that executive functioning only has an indirect effect on quality of life, and that SIB has the direct effect. These findings emphasize the importance of SIB on quality of life and the potential role that executive functioning may play in the SIB of autistic
Background: Research suggests that autistic adults are vulnerable to age-related cognitive decline (Pagni et al., 2022), co-occurring mood conditions (Lever & Geurts, 2017), ongoing social challenges (Walsh et al., 2019), and attenuated quality of life (Braden et al., 2022). Despite this, supports for autistic adults beyond young adulthood are exceptionally limited.

Objectives: 1) To describe protocol development for the Strengthening Skills Program (SSP), a multi-component program for autistic adults of all ages that aims to empower participants to improve their quality of life. 2) To examine and compare feasibility and acceptability of SSP and an adapted version of the PEERS social skills program.

Methods:

Development and iterative revision of the protocol was based on focused interviews with stakeholders and feasibility and acceptability data from a pilot RCT comparing SSP and PEERS (Fig. 1). The study team included an autistic doctoral student and autistic consultants provided feedback on program content. Focused interviews included 5 autistic adults (30-68 years; 3 male) and 4 stakeholders selected by the autistic adults (e.g., family/friend). Separate 90-minute interviews were conducted with autistic adults and stakeholders to identify priorities and solicit feedback and suggestions regarding topics and format of SSP.

Pilot RCT participants included 42 adults (Age=41.43±13.99 years; 59.5% male) who met criteria on the ADOS-2 and up to one program partner of each participant (i.e., family/friend). Across two cohorts (Fall 2021, Spring 2022) participants were randomly distributed across three groups: SSP (n = 14), PEERS (active comparator; n = 14), or delayed treatment control (DTC) (n = 14). Random assignment was stratified by age, gender, and presence of a program partner.

Both programs were delivered through Zoom during the pandemic. SSP participants attended weekly 3-hour group meetings that included discussion of cognitive compensation skills (e.g., habit formation; external memory aids), mindfulness-based strategies, and strategies adapted from the PEERS social skills program for young adults. PEERS participants attended weekly 90-minute group meetings. Feasibility and acceptability were assessed by examining fidelity of implementation checklist data and quantitative and qualitative responses on a post-program participant satisfaction questionnaire.

Results: Fidelity of implementation ranged from 94-100% for SSP (M=99%) and 85-100% (M=97%) for PEERS. Descriptive statistics and themes identified from qualitative responses on the post-program participant satisfaction survey are reported in Table 1. Composite acceptability scores on the participant satisfaction survey for SSP participants were significantly higher than PEERS participants (t(19) = 2.21, p = .04).

Conclusions: Iterative development of SSP resulted in a program that has promising feasibility and acceptability. Attrition was higher in the SSP group (36%) relative to PEERS (14%), which may indicate reduced feasibility of a 3-hour program relative to a 90-minute program. Acceptability composite scores indicated that SSP had higher acceptability than PEERS. Although there was considerable overlap in qualitative themes across the two programs, limitations of PEERS were related to program content and method, whereas limitations of SSP were related to program format. Delivery of the revised program protocol with DTC participants is ongoing; future research will examine effectiveness of SSP.

Background: Interpersonal synchrony, or the temporal coordination of one’s own behaviors with the behaviors of others, mediates social exchange to establish natural interactions and facilitate rapport. However, interpersonal synchrony is often attenuated between autistic individuals and their interaction partners (Georgescu et al., 2020). It is not yet clear whether this attenuation stems from issues with motor production or difficulties in perceiving the timing of others’ behaviors. Little research has investigated how interpersonal synchrony is perceived in autism; thus, the contribution of perception warrants investigation.
Objectives: Approaching this gap from a participant’s perspective, the present study aims to clarify how interpersonal synchrony is behaviorally perceived in individuals with and without autism, as well as parsing features of the interaction that may influence interpersonal synchrony perception formation.

Methods: 33 autistic (11 women, age M(SD) = 35.16(10.52) years) and 29 non-autistic (11 women, age M(SD) = 34.31(11.68) years) individuals participated in two 10-minute conversational tasks with a non-autistic stranger, who was a research assistant naïve to the participant’s diagnostic status. Videos of the interaction were recorded and analyzed with Motion Energy Analysis to assess nonverbal movement synchrony between partners. Participants also reported how synchronous they perceived the interaction to be and their experience of rapport (e.g., likeness of the partner) with the partner. Linear models and linear mixed effects models were used to analyze the data.

Results: In line with previous work, dyads including an autistic individual produced less movement synchrony than dyads of two non-autistic individuals. Moreover, autistic participants reported perceiving the interaction as less synchronous than non-autistic participants. Interestingly, there was no effect of movement synchrony production on synchrony perception or rapport. However, there was an effect of rapport on reported synchrony perception.

Conclusions: Our findings suggest that behavioral synchrony perception may be altered in autism, and hints that access may be limited to the low conscious processing of synchronous behaviors, wherein rapport may instead guide behavioral synchrony perception formation.

420.033 (Poster) The Driving Profile of Individuals with Autism Spectrum Disorder

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Background: A major developmental milestone facilitating the transition into adulthood, by increasing functional status and quality of life, is the ability to drive; however, only 1 in 3 individuals with ASD obtain licensure by age 21 (Curry et al., 2021). Evidence suggests that autistic drivers are not generally at greater risk of negative driving outcomes, but face unique challenges based on skills needed in specific driving contexts. By understanding the differential needs of autistic drivers, researchers can develop and implement effective and adapted interventions to increase this population’s driving skills and, thus, quality of life.

Objectives: Identify, systematically organize, and critically evaluate driving behaviors and impairments related to the safe operation of a motor vehicle to determine a comprehensive understanding of the driving profile of autistic individuals.

Methods: Data was systematically (PRISMA, 2009) extracted by two independent reviewers from articles that met pre-specified inclusion criteria: published in English between 2000 and 2021, peer reviewed, included a sample of people with ASD or people working with those with ASD. Methodology used in studies examining autistic drivers included: 18 simulators, 11 qualitative reports, 4 computers, 3 on-road observations, 1 mixed methods. Results were extracted and driving skills were organized and evaluated at the strategical (planning the drive), operational (operating the vehicle), and tactical (maneuvering the vehicle within the environment) levels of driving based on the theoretical framework proposed by Michon’s Hierarchal Model of Driving (Michon, 1985).

Results: The 37 qualifying articles included a comprehensive sample of studies with a wide range of sample size (N=7-609) and driver age (15-60 years). 89.7% ASD drivers who obtain their permit later obtain their license, although time between permit and license is 9.2 months longer than that of non-autistic drivers.

The social and cognitive impairments commonly associated with ASD impact the driving experience. To compensate, autistic drivers adapt their driving behavior and environment within the strategical level of driving to increase predictability and consistency within their driving environment. At the operational level of driving, autistic drivers exhibited challenges in driving simulators, but qualitative reports by both parents and driving instructors as well as on road performance show less underperformance in these skills. The biggest challenges faced by autistic drivers are at the tactical level of driving (e.g., multitasking, response to the driving environment, reaction to unpredictable situations). Despite the challenge of tactical skills, autistic drivers show similar to lower rates of adverse driving outcomes, including crashes, violations and suspensions on-road compared to typically developing drivers.

Conclusions: Autistic drivers report challenges and display deficits in driving skills particularly in self-report or in a driving simulator, but these impairments do not directly translate to on-road driving. Autistic drivers place restrictions on themselves to increase safe driving behavior and experienced autistic drivers show fewer driving skill deficits. Continued research focused on autistic drivers is needed to provide a comprehensive understanding of their driving behaviors and advocate for implementation of strategies to increase licensure amongst safe drivers, thereby increasing quality of life throughout adulthood.

420.034 (Poster) The Experiences of Autistic Medical Students: A Phenomenological Study
Background: Increasing recognition of autism, and particularly late-diagnosed autistic adults, is reflected in the growing awareness of autistic healthcare providers. Regulatory bodies including the UK General Medical Council and the UK Medical Schools Council have published guidance that actively fosters inclusion. Little is known about the numbers of autistic students studying medicine. The total number of students at English universities identifying as autistic more than doubled between 2014/15 and 2020/21. Medicine and dentistry have relatively lower proportion of students identifying as disabled compared to other disciplines, although numbers had risen from 8.3% in 2014/15 to 11.1% by 2018/19. Whilst many autistic doctors and students are thriving, most do not disclose their diagnosis unless difficulties arise, which unfortunately perpetuates stereotypes.

Objectives: No studies have explored the experiences of autistic medical students. We aimed to fill this void.

Methods: This was an interpretive phenomenological study by an autistic-led research team. Phenomenology is a qualitative methodology grounded in social constructionism, which strives to explore the ‘lived experiences’ of participants, while interpretive phenomenology also embraces the subjective experiences and beliefs of the researcher. As such, this study design is well suited to teams including insider researchers. This was an important consideration, as our research team includes two autistic doctors. Autistic medical students were recruited using Facebook announcements. Those who consented to participate underwent audio-recorded, loosely structured interviews. Recordings were transcribed and underwent an interpretive phenomenological analysis.

Results: Five participated from five different UK medical schools. Themes included: autistic profiles and stereotypes; sensory processing, the learning environment and its impacts; diagnosis, identities and masking; peers, socialising, isolation and role models; seeking help, reasonable adjustments and medical school processes. Participants reported a variety of strengths and challenges. They all agreed that being autistic carried strengths which could benefit the profession. In fact, the ability to help autistic people provided an incentive to persevere with their studies with one participant describing a desire “to figure myself out and help others like me”. Common challenges centred around uncertainty, social concerns, and a lack of structure or routine. Communication was a strength and a challenge, dependent on context. The well-defined social roles within patient interactions facilitated ease and skill. As one participant explained, “I’m a lot better with patients than I am with my peers, with staff, which is hard for a lot of people to understand.” All had disclosed being autistic to their medical schools. Some had disclosed to clinical supervisors, with varying degrees of success.

Conclusions: Participants longed for understanding and support, but reported experiences of isolation, bullying and anxiety. Most felt themselves to be victims of the system; expected to adapt themselves to appear non-autistic. When participants reported difficulties, most were advised to take time out. None were offered personalised adjustments. All reported strengths associated with being autistic, including attention to detail, a methodical approach, and heightened empathy. This supports the idea that autistic individuals can be safe, effective, and skilled doctors.

420.035 (Poster) The Impact of COVID-19 on the Mental Health and Socioeconomic Outcomes of Autistic Adults in the United Kingdom: A Prospective 12-Month Follow-up Study. J. Findon, R. A. Hoekstra, M. Cella, and F. Cotier, (1)Department of Psychology, Institute of Psychiatry, Psychology and Neuroscience, King’s College London, London, United Kingdom, (2)Department of Psychology, Institute of Psychiatry, Psychology and Neuroscience, King’s College London, London, UNITED KINGDOM

Background: The COVID-19 pandemic has had a significant impact on mental health and socioeconomic outcomes. Autistic adults, who are already at increased risk of poor mental health are likely to have been disproportionately affected. Understanding the experiences of autistic adults across the course of the pandemic is crucial to ensure targeted support in the post pandemic age.

Objectives: The current study aims to explore the mental health and socioeconomic impact of the COVID-19 pandemic on autistic adults in the UK over a 12-month period using a longitudinal design.

Methods: A total of 3614 participants (Mage = 52.67(12.4), Female = 87.4%) completed an online survey between 8th April and 11th May 2020. Participants self-reported on symptoms of anxiety (Generalized Anxiety Disorder-7 [GAD-7]) and depression (Patient Health Questionnaire-9 [PHQ-9]) and their experiences of the pandemic. At baseline we included two versions of the GAD-7 and PHQ-9 – one assessed retrospective symptoms (T0) before the onset of the pandemic, the other assessed current symptoms (T1). The sample included 133 adults who declared a clinical diagnosis of an autism spectrum disorder (ASD). Participants also responded at +3Months (T2; n=2312), +6months (T3; n=1774) and +12Months (T4; n=1911).

Results:

At all time points symptoms of anxiety and depression were higher among autistic adults compared to non-autistic adults. In both groups there were significant (p<.001) and large increases in anxiety and depression symptoms from T0 to T1. Symptoms of anxiety gradually
declined from T2-T4 and returned to baseline levels by T4 in both groups. However, while depression symptoms gradually declined in the control group, they remained high in the ASD group. A mixed model ANOVA revealed a significant group*time interaction indicating that the difference in PHQ scores widened between T3 and T4 (f=6.39, p<.05). Autistic adults reported more frequent socio-economic impacts than controls across a range of domains including being unable to do paid work (ASD: 34.1%, control: 19.3%), being unable to access medication (ASD: 22%, controls: 8.1) or essential services (ASD: 46.3%, controls: 27.2%; see also Table 1). Multiple regression analysis predicting depression scores at T4 indicated significant effects of autism diagnosis (β=3.7), lack of access to services (β=2.7), lack of access to paid work (β=1.1) and lack of access to medication (β=3.9).

Conclusions: Our findings reveal that the COVID-19 pandemic has had a significant long-term impact on the mental health and socioeconomic outcomes of autistic adults. Furthermore, autistic adults have been disproportionately impacted compared to non-autistic adults, widening existing inequalities. Autistic adults reported greater socioeconomic impacts, and these impacts in turn predicted enduring depression symptoms. These findings highlight the need for targeted support for autistic adults to address barriers in service access and to support their long-term mental health.

420.036  (Poster) The Impact of Cognitive Impairment on Service Utilization Among Transition-Aged Youth with ASD
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Background: Transition from adolescence to adulthood is a critical period for individuals with autism spectrum disorder (ASD). While transition outcomes for youth with ASD have been previously described, few studies have evaluated the service utilization patterns of youth and young adults with ASD and ID leading up to and including transition years.

Objectives: The goal of this study was to describe and compare service access and utilization by young adults with ASD (with and without ID), ID alone, and population controls (PC) during the specific period of transition from childhood to adulthood (ages 17-23).

Methods: Using record linkages with state agency datasets and a cohort of individuals with ASD and/or ID identified via the South Carolina Autism and Developmental Disabilities Monitoring Network (SC ADDM), transition-period service utilization and access was analyzed for transition-aged youth ranging in age from 17 to 23 years. Four groups were compared: ASD-only (n=315), ASD+ID (n=291), ID-only (n=1,271), and PCs identified via birth certificate records frequency matched 5:1 to ASD cases (n=2973). Generalized linear mixed model derived estimates were used for pair-wise comparisons with covariate and multiple-comparison adjustments.

Results: Those with ID-only were more likely to have received mental health services than PC, and all 3 disability groups had more mental health encounters than PC. ASD+ID were more likely to be eligible for state disability-specific services, and among those eligible, were more likely than individuals with ASD-only to utilize these services. Fewer than half of those eligible actually utilized disability-specific services regardless of group. Youth with ASD+ID were far more likely than the other three groups to have out of home placements. Those with ASD+ID were also more likely than those with ASD-only or ID-only to qualify for Medicaid and to have outpatient medical encounters. These participants had more healthcare providers, and were more likely to be prescribed psychotropic medications. Those with disabilities were more likely than PCs to receive therapeutic interventions during the transition period, but rates were low across all three disability groups (less than 1/3). Those with ASD+ID were also far more likely to be enrolled in school during the transition period.

Conclusions: Results indicate that participants with ASD+ID represent a distinct group with higher service utilization during the transition years than those with ASD or ID alone. Those with ASD+ID were more likely to receive physical health, mental health, and educational services during the transition period. They were also more likely to qualify for disability-specific insurance benefits during the transition years than those with ASD or ID alone. These results indicate that those with ASD or ID alone may be “under-treated”. Although many are eligible for services, relatively few, particularly within the ASD-only and ID-only groups, are receiving services during this key transition time period, representing the need for early and targeted interventions to ensure that patients are able to access necessary supports and services during the critical period of transition from adolescent to adulthood.

420.037  (Poster) “I Live in Extremes”: Understanding Autistic Adults’ Phenomenological Experiences of Inertial Rest and Motion
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Background: The term ‘inertia’ was adopted by the Autistic community several decades ago to refer to the seemingly common experience of remaining in a mental and physical state of rest or motion until there is some form of intervention. Although ‘Autistic inertia’ is now part of the Autistic community’s everyday lexicon, the condition has received scant attention in the scholarly literature. The little attention it has received has narrowly focused on ‘inertial rest’ (i.e., difficulties with initiating tasks), with minimal exploration of ‘inertial motion’ (i.e., difficulties with stopping).
Objectives: Here, we sought to investigate Autistic people’s phenomenological experiences of inertial rest and motion. Furthermore, we aimed to identify underlying mechanisms and moderators of inertia, and the everyday impact of Autistic inertia.

Methods: We adopted a participatory approach in which Autistic and non-autistic researchers worked together as a team to design and implement this study. Twenty-four Autistic adults (Mage = 44.3 years, range: 19 – 71 years; 11 women, 7 men, 4 non-binary, 2 other) agreed to take part in in-depth semi-structured interviews over Zoom, conducted by an Autistic or non-autistic researcher. Participants were asked about their difficulties with starting and stopping tasks, including how these experiences made them feel, the duration and frequency of these experiences, their perceived causes, what helps, and the impact of starting and stopping difficulties on their everyday lives. We followed Braun and Clarke’s method for reflexive thematic analysis to analyse the data using an inductive (bottom-up) approach within a critical realist framework.

Results: We identified four themes relating to Autistic experiences of starting and stopping everyday tasks. Themes and associated subthemes are summarised in the figure below. Interviewees spoke in-depth of their inertial “difficulties moving from one state to another” (Theme 1) and described how these challenges pervade “every single day” (Theme 2). While inertia was described as “the single most disabling part of being Autistic” (Theme 3), interviewees also described some effective ways to respond to it (Theme 4), including taking pleasure in states of flow, when they could become completely “engrossed” in a task.

Conclusions: While participants’ emphasised that inertial difficulties are “very human problems”, our findings reveal the often-extreme nature of these difficulties for Autistic people. Our findings also contribute to a more holistic characterisation of inertia as both a disabling and enabling condition. We discuss these findings within the context of predictive coding models of autism and propose divergent precision weighting as one possible mechanism underlying Autistic inertia. Specifically, we suggest inertia may be the product of a neural system that ascribes relatively high salience to prediction error signals, irrespective of context.

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**420.038 (Poster)** Within-Family Differences in Autistic Traits and Young Adults’ Sibling Relationship Quality

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**Background:**

Research highlights that those with autism spectrum disorder (ASD) have lower sibling relationship quality compared to those with other disorders such as Down syndrome (Aksoy & Yildirim, 2008; Pollard et al., 2013) and intellectual disability (Tomeny et al., 2017; Travers et al., 2020). Among those with ASD, a higher level of autistic traits (AT) is also linked to poorer sibling relationship quality (Hastings & Petelas, 2014; Orsmond et al., 2009). Each of these studies, however, makes comparisons between families. Between-family comparisons mask the potential of the role within-family differences in AT may play in shaping sibling relationship quality in families with more than two children. For example, although siblings are typically similar in AT (Hoekstra et al., 2007), a young adult may develop a better relationship with a sibling who has fewer AT than other sibling(s) in the family.

**Objectives:**

Examine within-family differences in AT among siblings as linked with seven dimensions of sibling relationship quality: closeness, conflict, ill-wishes, upward comparison, parent-mediated relationships, contact, and desired contact.

**Methods:**

Data come from 490 young adults, with at least two siblings, living in the United States (reporting on 1215 sibling relationships). Participants ranged between 18 and 29 years old (Mage = 25.38, SD = 2.52). The sample was mostly female (57%) and Caucasian (73%). Participants reported each of their siblings’ AT using the Autism Spectrum Quotient questionnaire (Baron-Cohen et al., 2001) and their relationship quality with each sibling using the Emerging Adults’ Relationships with Siblings Scale (Jensen et al., 2022). Data were collected via Amazon Mechanical Turk.

**Results:**

Analysis was conducted in separate multilevel models for each relationship quality variable, controlling for important demographic variables. Each dependent variable was modeled as the deviation from the family mean. We included the average of the AT among all siblings in the family and the sibling’s deviation from the family mean.

Results revealed (see Table 1) that young adults who perceive a sibling to be higher in AT relative to other siblings in their family report comparatively less closeness (b = -.01, se = .01), less upward comparison (b = -.01, se = .00), less parent mediation (b = -.02, se = .00), more contact (b = .04, se = .01), and a greater desire for contact (b = .04, se = .02).
Conclusions:

Overall, these results suggest young adults’ relationships with siblings who are higher in AT than other siblings in the family are multifaceted. On one hand, they feel less close to and engage in less comparison with those siblings. On the other hand, they engage in more contact, want more contact, and rely less on parents to maintain their relationship. It is possible that young adults are more proactive in connecting with their sibling highest in AT as a means of supporting them, even if they feel less close. These findings highlight the potential role of differences between siblings in shaping the nature of young adults’ sibling relationships.

420.039 (Poster) The Relationship between Autism and Suicide: Risk Factors and Potential Mitigation Strategies

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Background:

Suicide is a global problem, and individuals with autism may be at particular risk due to risk factors such as comorbidities with mental illnesses, poor self-esteem, social isolation, lack of supportive relationships, and psychosocial stressors. Suicidality among autistic people is an emerging area of research. To understand risk factors unique to autistic people, the Interpersonal-Psychological Theory of Suicide (IPTS) model for the general population was modified by Pelton and Cassidy (2017) to include predictors for suicide based on autistic traits. However, there is a lack of understanding of factors related to suicidality among young autistic adults without intellectual disability. Thus, there is a pressing need for a psychological theoretical model to analyse suicidality risks in this population.

Objectives:

1. To summarise the current literature surrounding suicidality for young autistic adults without intellectual disability.
2. To expand upon the IPTS model of suicide, as modified by Pelton and Cassidy (2017).

Methods:

This scoping review was conducted using Google Scholar. It focused on scientific articles published in peer-reviewed journals from 1994 to 2022, with an emphasis on those that sampled young autistic adults without intellectual disability. The search included the key words “autism”, “suicide”, “risk factors”, “comorbidities”, and “suicide prevention”. Articles were included in the synthesis even if they contained samples of non-autistic suicidal young adults, as the findings were still potentially pertinent to the research objectives. The final number of articles included was 55.

Results:

The findings suggest that existing suicide support mechanisms, such as peer support groups, therapy, and safety planning, for young adults with autism without intellectual disability fit into the main components of the IPTS model—perceived burdensomeness, thwarted belonging, and capability for suicide, respectively. There appear to be gaps in the literature pertaining to suicide support mechanisms catered to young autistic adults without intellectual disability, which is a particularly vulnerable group (e.g. Hannon and Taylor, 2013). Based on the literature review, we propose a new dimension of the IPTS model (Figure 1): the intersection between perceived burdensomeness and thwarted belonging, as the existing model does not capture all aspects of perceived burdensomeness and thwarted belonging, and that not every autistic trait falls neatly into one category or another. Potential interventions that target the new dimension of the model would include vocational education groups for employment and modified therapeutic approaches.

Conclusions:

Areas for further improvement of existing suicide support mechanisms include adapting the models to accommodate autistic people and including autistic people in the field of suicide research. While the research surrounding suicidality for autistic adults is emerging, there appears to be gaps in breadth and depth. The IPTS model for autistic traits states that three factors contribute towards suicidality. This may be improved to apply to young autistic adults by including the overlap between perceived burdensomeness and thwarted belonging. Areas for future research include interdisciplinary collaboration between the autistic community and researchers to identify the causes of suicide, implementation of autism-specific risk assessment and prevention tools, and education of clinicians and the general public about autism and suicide.

420.040 (Poster) The Reliability and Validity of a Novel Autistic Burnout Measure Among Neurodiverse College Students

Background: Autistic burnout (ABO) is a recently-described phenomenon characterized by periods of exhaustion, social withdrawal, poorer executive functioning and quality of life, and more, which putatively occurs in autistic individuals after exposure to prolonged stressors such as social and sensory burdens (e.g. Raymaker et al., 2020). Despite ABO’s hypothetical role in pathways to depression and suicidality in autistic people, few studies have explicitly attempted to investigate it. ABO has not been fully operationalized or quantitatively measured in the peer-reviewed literature, nor has its association with mental health been explored quantitatively.

Objectives: The present study sought to (a) evaluate the internal consistency of a novel measure attempting to operationalize ABO, and (b) explore whether ABO exhibits convergent and discriminant validity with theoretically-related and unrelated variables. ABO was hypothesized to be positively associated with autistic traits, depression, anxiety, stress, social anxiety, repetitive thinking, and repetitive behavior, as well as gender, birth sex, and sexual orientation (since sexual and gender minorities often report higher levels of internalizing symptoms), and negatively correlated with engagement in passionate interests and availability of friendships. Age, race, ethnicity, and university one attends were hypothesized to have no correlation with ABO.

Methods: First-semester college students (N=62) completed a survey battery at the end of the fall 2021 semester as part of a larger longitudinal study (Table 1). Participants either reported a formal diagnosis of autism (n=8), suspected undiagnosed autism (n=19), or were non-autistic (n=35). Autism was measured dimensionally using the Social Responsiveness Scale, 2nd Edition (SRS-2; Constantino & Gruber, 2005). Reliability of a novel 8-item ABO survey was assessed using Cronbach’s Alpha. Cross-sectional Pearson correlations and one-way ANOVAs were used to determine ABO’s convergent and discriminant validity via its associations with mental health and demographic variables.

Results: The ABO scale items exhibited high internal consistency (α=.91). Participants did not differ on ABO scores by self-reported autism status (Table 1), but dimensional autistic traits (SRS-2) exhibited a large positive correlation with ABO scores (Table 2). ABO was positively associated with all hypothesized variables but, contrary to hypotheses, not associated with levels of engagement with passionate interests and friendships. As expected, ABO was not associated with age, race, ethnicity, or university.

Conclusions: A new measure of ABO demonstrated strong internal consistency. Hypothesized correlations largely support the ABO measure's convergent validity, while hypothesized nonsignificant correlations (i.e., age, race, ethnicity, university) support its discriminant validity. These results affirm ABO’s potential ties with symptoms of depression and anxiety, stress, and repetitive thinking and with sex/gender. However, it remains unclear whether a measure of ABO can distinguish burnout as an autism-specific phenomenon. Further efforts are needed to establish if ABO is autism-specific and how ABO may fit into the time course and etiology of mental health concerns, namely depression and suicidality, in autism.

420.041 (Poster) What Do Autistic Adults Need to Attain Employment Fast? L. K. Fung1, M. Gavartin1, C. Matta2 and L. Mohamed2, (1)Psychiatry and Behavioral Sciences, Stanford University, Stanford, CA, (2)Stanford University, Palo Alto, CA

Background:

About 80% of autistic adults are unemployed or under-employed. Although the general employment outcomes are known to be poor, little is known about factors driving attainment of job opportunities and the duration of job search needed to achievement employment.

Objectives:

This study is part of a larger on-going investigation in determining the effects of a specialized employment program (a psychosocial intervention) on job retention and quality of life. In this presentation, we focus on the participants’ baseline data and their employment outcomes. We hypothesize that participants with higher level of social skills knowledge will attain employment sooner.

Methods:

Eligibility criteria for participating in the study include: (1) documented diagnosis of autism, (2) age 18 to 55 years, (3) IQ >59, and (4) current job seekers. Participants received support in preparation of their interviews. Investigators negotiated with employers on accommodations that can reduce participants’ level of anxiety. Employers also received training on awareness of neurodiversity and best practices in recruiting autistic adults. Demographic information as well as behavioral measures (Autism Spectrum Quotient (AQ), Test of Young Adult Social Skills Knowledge (TYASSK), Rosenberg’s Self-Esteem Scale (RSES)) were collected at baseline. Descriptive
Background: Initial research has identified a higher co-occurrence of transgender identity among autistic individuals than among the general population. Some transgender individuals access gender-affirming healthcare through gender dysphoria diagnoses. While gender dysphoria is a condition stemming from incongruence with gender identity and sex assigned at birth, the diagnosis is often a politically fraught requirement to receive healthcare. Claims data has never been used to examine trends and demographics of transgender autistic individuals receiving gender dysphoria diagnoses. Medicaid is a major insurer of both autistic and transgender patients, especially as both populations are at increased vulnerability to poverty. Recent speculation proposes that this population is growing. Currently in the U.S., state laws dictate whether and how gender-affirming care can be covered under Medicaid. However, we do not yet know how this state-by-state healthcare provision impacts autistic patients. National data from systems delivering services to autistic transgender youth and adults is needed to describe necessary service and system improvements.

Objectives: This study used Medicaid claims data to 1. understand the general demographic trends among the Medicaid patient population receiving both ASD and GD diagnoses, and 2. Analyze state policies to better contextualize these rates.

Methods: Descriptive statistics were calculated for demographic and Medicaid enrollment characteristics. Two groups were defined: 1. An autism claims group (N = 467,321). 2. A control group (N = 1,730,686) representing a random sample of 3.5 million Medicaid beneficiaries with no ASD nor intellectual disability (ID) claim. We compared the ASD and control groups using t-test for age, and χ² tests for all other categorical variables.

Results: The prevalence of enrollees with GD claims was higher among the ASD sample than the control sample, with .34% or 340 per 100,000 having both GD and ASD claims as compared to .04% or 39 per 100,000 GD claims in the non-ASD control sample. The estimated GD prevalence per 100,000 autism claims for those 9 years increased from 9 per 100,000 in 2008 to 150 per 100,000 in 2016. Comparatively, the GD prevalence among the control sample increased from 6.5 per 100,000 claims in 2008 to 47 per 100,000 claims in 2016. Most enrollees with both claims were children, which was similar to the control group. However, more racial diversity and enrollees who were assigned female at birth were present in the ASD group versus control. There was substantial variation by state that reflected state laws, but also indicated the presence of major gender clinics was important for states without explicit laws.

Conclusions: The Medicaid population receiving both autism and gender dysphoria claims is growing – faster than the general population – and is less white, male, or young than the previous literature suggests. We offer this data to specifically discern the characteristics of this population to help better support them, and argue for more integration of Medicaid claims to understand the impact of state policy on healthcare.
The Wider Experiences and Contexts of Camouflaging for Autistic and Non-Autistic Individuals

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Background:

There is a wealth of literature surrounding the causes and consequences of camouflaging for autistic individuals. Research is limited about the wider contexts affecting camouflaging behaviours and also the decisions to camouflage. There is also no in-depth research to date to understand the camouflaging experience for non-autistic individuals.

Objectives:

To understand the wider experience of camouflaging for autistic and non-autistic individuals.

Methods:

Participants were recruited through volunteer databases and social media. Data were available for 478 autistic 175 non-autistic adults, all of whom identified as camouflaging in their daily lives. Among other measures relevant to the wider study, participants completed an online survey about the reasons for, and positive and negative consequences of camouflaging, as well as contexts in which individuals camouflage. This research analyses the free text responses from participants using an inductive, semantic, thematic analysis. Two coders individually coded the data using a critical realist approach, and met regularly to compare coding and themes.

Results:

Five themes were identified: 1) Awareness of camouflaging; 2) Impressions; 3) Transactions; 4) Mental Health; and 5) Context. Awareness of camouflaging describes how individuals either consciously or unconsciously camouflage, and whether the decision to camouflage is automatic vs. intentional. Some individuals described a transition in their awareness of and participation in camouflaging behaviours, as a result of greater awareness of autism and/or camouflaging as a construct. Impressions describes those self-imposed by the individual, through ideas about how people should behave and the impression they want to give, as well as external factors such as judgement from others. Participants also described resulting damage to self-identity, fears about identity management if contexts mixed, and concerns about perceptions by others if they were discovered. Participants described camouflaging as transactional, to further goals such as career, friendships, avoid negative consequences, or even to reduce conversation length. For many, there were mental health implications attached to camouflaging. This varied between participants, with some camouflaging to hide mental health difficulties, while others experienced mental health difficulties as a consequence of either camouflaging or not camouflaging. Context described how an individual or a place could influence whether an individual felt the need to camouflage, due to factors such as feeling safe or accepted. Longstanding relationships, trust in the individual, and shared experience were described as individual factors, as well as being at home or alone as safe places. Differences in experience of autistic and non-autistic individuals will be discussed, where relevant.

Conclusions:

Camouflaging is a very individual experience with different participants citing different causes, consequences, and circumstances in which they are comfortable to be themselves. While the literature and our own findings show that camouflaging has negative consequences, it has a very important purpose. We need to understand more about how to create environments where people feel comfortable to present as their non-camouflaging selves.
Objectives: The overall aim of this was to explore the strengths and challenges of intersectional experiences and healthcare needs of adults who identified as autistic and gender diverse.

Methods: Twelve gender-diverse autistic adults (mean age= 27 years, SD= 9). Participants described their gender as: non-binary (n=5), transmasculine (n=3), non-binary female (n=1), non-binary/agender (n=1), genderqueer (n=1), and genderqueer woman (n=1). Participants completed an online semi-structured interview (n=2) or an open-ended survey (n=10). Reflexive thematic analysis was used to analyse the data, following the six phases of analysis (Braun and Clarke, 2013;2022).

Results: Three key themes were generated from this data: (1) navigating a gender journey - participants felt they understood gender differently from neurotypical cisgender individuals and emphasised the importance of self-authenticity. (2) The impact of social context on self – participants discussed both increased discrimination and invalidation, but also facilitative relationships founded in commonality. (3) Provision of healthcare – participants stated that healthcare professionals lack awareness of the co-occurrence of autism and gender diversity which limits the support they receive and reflects a lack of training. Participants discussed the negative experiences they had faced more generally when accessing healthcare but also identified ways in which autistic gender-diverse adults could be better supported.

Conclusions: This study builds on recommendations from previous research that qualitative research must better understand the experiences and needs of this under-served community. Here we extend knowledge in this area by capturing the experiences of the intersection of autism and gender diversity in adulthood. The findings demonstrate the intersection of being both an autistic and gender-diverse adult can present individualised challenges but can also be a positive experience. Results also highlight the difficulties that autistic gender-diverse participants experienced when trying to access support. This study contributes to this limited evidence base by provide novel and important insights on the intersection of autism and gender diversity in adulthood and has important implications for clinicians and healthcare provisions.

420.045 (Poster) Trait Anxiety, Camouflaging and Adjustment to College in Women with and without Autism Symptomatology
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Background:

Females may express autism symptomatology differently than males and therefore may be less likely to be diagnosed (Loomes et al., 2017). For example, females may engage in more camouflaging behaviors during social situations (e.g., making eye contact) than autistic males (Hull et al., 2020; Lai et al., 2015). Although potentially beneficial, camouflaging behaviors are associated with increased anxiety (Halsall et al., 2021). In conjunction with high rates of trait anxiety (Jolliffe et al., 2022), this can make adjustment to college difficult.

Objectives:

Objectives were: (1) to explore group differences in trait anxiety, camouflaging and adjustment to college in women with and without autism symptomatology and (2) to examine the unique contributions of autism symptomatology, trait anxiety and camouflaging behaviors on adjustment to college.

Methods:

Participants were 102 female college students attending a university in the U. S. (Midwest region). Table 1 provides demographic information for the sample. Following informed consent, students completed these online measures: autism symptomatology (Social Responsiveness Scale-2; Constantino & Gruber, 2012), trait anxiety (trait subscale, State-Trait Anxiety Scale; Spielberger et al., 1993), camouflaging (Camouflaging of Autistic Traits; Hull et al., 2019), and adjustment to college (Student Adaptation to College Questionnaire-SACQ; Baker & Siryk, 1999). SACQ adjustment subscales assessed for this study were academic (managing of academic demands), social (integration into social settings) and personal-emotional (psychological and physical well-being). On the SRS-2, a raw score cutpoint value of 70 or greater can be indicative of autism symptomatology (Constantino & Gruber, 2012). Cronbach alphas were good to excellent (α = .88-.94) on all measures.

Results:

Table 1 presents group comparisons on the study variables including t, p, and d values, and means and standard deviations. Females with autism symptomatology reported significantly higher camouflaging behaviors and trait anxiety, and lower academic, social and personal-emotional adjustment to college, than those without autism symptomatology. Pearson correlation analyses showed that camouflaging behaviors were related to increased trait anxiety and negatively related to adjustment types, p’s < .05. Linear regression analyses showed that autism symptomatology and trait anxiety were significant predictors of academic adjustment to college, whereas only trait anxiety was a significant predictor of social and personal-emotional adjustment. Autism symptomatology approached, but was not significant for social adjustment. Camouflaging was not a significant predictor of adjustment (see Table 2).
Conclusions:

Results showed that women with autism symptomatology experience more trait anxiety, camouflaging behaviors and less adjustment to college than those without autism symptomatology. Autism symptomatology and trait anxiety were significant predictors of academic adjustment, suggesting that both affect the student’s ability to manage the academic demands of school. In contrast, only trait anxiety was a significant predictor of social adjustment (i.e., social integration) and personal-emotional adjustment, or students’ mental (e.g., psychological distress) and physical (e.g., sleep) well-being. Although camouflaging was not a significant predictor of adjustment, camouflaging was negatively related to adjustment scales. Camouflaging was also related to higher trait anxiety. Study findings suggest that college support programs targeting anxiety in women with autism symptomatology—regardless of formal diagnostic status—may be particularly beneficial.

420.046 (Poster) Transdiagnostic Approaches to Supporting Mental Health of Autistic Adults.


Background: Co-occurring psychiatric conditions are common in autistic adults, with many experiencing multiple anxiety and mood disorders (Joshi et al., 2013; Jadav et al., 2022). This suggests transdiagnostic approaches targeting symptoms across conditions may be beneficial. Brief and problem-focused interventions to support individuals through periods of distress (e.g., postsecondary transition; COVID-19 pandemic) and treatments that teach strategies that can be applied to a variety of situations that cause or maintain depression or anxiety are needed.

Objectives: To describe the development of two transdiagnostic approaches to support the mental health of autistic adults:

1) Self-guided Emotional Safety Plan (ESP-S), a brief telehealth and mobile intervention, modeled after suicide safety plans (Brown & Stanley, 2012), designed to help autistic adults anticipate and prepare for distressing situations;

2) Group Behavioral Activation Therapy (GBAT, Chu et al., 2009), a 10-week group designed to treat non-autistic youth was adapted for telehealth for autistic adults with depression, anxiety or anger.

Methods:

ESP-S: Written and video-based instructions and materials to support ESP-S creation were developed by a team of autistic and non-autistic students and faculty. Six college students provided feedback immediately after creating their ESP-S and after 14 weeks (NCT04926090).

GBAT-A: GBAT was adapted to improve appropriateness for adults. Five autistic adults completed GBAT-A (NCT04788212). Based on feedback, autistic and non-autistic adult collaborators are further adapting GBAT-A to enhance content relevance and engagement to boost participation and skill generalization; enhanced GBAT-A is currently being tested with two additional groups (n=10; NCT05512221).

Results:

ESP-S: On a scale of 1-3, students indicated that materials to support creation of ESP-S were all somewhat (2) or very helpful (3) (M=2.25-3) and creation of the ESP-S was neutral (3)-to-very easy (5; M=3.7). Some indicated it would have been more helpful to have someone walk them through the process than do it on their own. After 14-weeks, ratings were neutral-to-positive regarding how helpful the self-guided intervention was for them (Fig.1). One participant felt the ESP-S had not had a positive impact on them because their therapy had covered this information, but that the ESP-S may be helpful to someone who did not already have coping strategies in place. Self-rated Emotion Dysregulation Inventory (Mazefsky, personal communication) showed some improvement (d=.457).

GBAT-A: In the original GBAT-A group, on a scale of 1-4, overall quality was rated as Good to Excellent (M=1.5), participants endorsed being Mostly to Very Satisfied with the help they received (M=1.25). Feedback highlighted a need for individual sessions and activities to allow more practice and personalized supports to increase generalizability of the lessons. Individual sessions added to the groups, as well as video-based educational materials and additional activities to personalize content are currently being developed and tested. Self-reported adaptive behavior, depressive and anxiety symptoms showed improvement (Fig.2).

Conclusions: Preliminary results support further efforts to refine both the ESP-S and GBAT-A. Discussion will center around how autistic engagement at different levels (participant feedback, consultants and co-developers) and stages of each project has critically informed
adaptation and development of these interventions.

**420.047 (Poster) Exploring Friendships between College Students with and without Intellectual and Developmental Disabilities**

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**Background:** Despite nearly 25 years of federally mandated transition services, youth with intellectual and developmental disabilities (IDD), including autism spectrum disorders, still experience poor post-school outcomes compared to their peers without disabilities (Bouck, 2012). Inclusive postsecondary education (IPSE) programs for students with IDD have been created and housed at colleges and universities nationwide to produce better post-school outcomes. Higher education provides a unique context for students with and without IDD to build friendships, engage in the campus community, and build social networks (Author et al., 2020; Bumble et al., 2019; Gibbons et al., 2018).

**Objectives:** While IPSE programs have developed rapidly over the past ten years, this growth demands a response by researchers to help identify best practices for promoting an equitable and inclusive campus community for those with and without IDD. Social peer programs allow students to learn and work together in supportive and inclusive educational environments. Thus, this study aimed to explore the insight and experiences of participants in a social peer program. This study was guided by the following research question: *How was your experience in the Social Peers program?*

**Methods:** Using a qualitative case study design, this study focused on the inclusive experiences of four participants, two students without IDD and two students with IDD. Data were collected through pre- and post-program individual semi-structured interviews with each participant, and students without IDD participated in two focus groups during the program. Data are analyzed by reading the transcripts and then conducting a thematic analysis with a triadic coding scheme (Strauss & Corbin, 1998) to identify the main themes and topics that emerge from the data.

**Results:** Two preliminary themes have emerged from the data: (1) **Missed Opportunities for Friendship** and (2) **Potential Campus Community Benefits**.

**Missed Opportunities for Friendship.** Students enjoyed the Social Peers program and were pleased to see a program like this on a college campus. They felt the program provided an opportunity to meet and get to know college students they may not have met had the program not existed. Several participants expressed dismay that they were not exposed to a program like this earlier in their schooling because they missed out on potential friendships.

**Potential Campus Community Benefits.** While the Social Peers program was small, students discussed how this program could potentially change the campus community for the better. They felt that the more students saw students with and without IDD together on campus and in familiar places (e.g., dining hall, classrooms), the inclusion of students with IDD would become “normal” and provide equitable opportunities to interact with each other in a typical social space.

**Conclusions:** IPSE programs are crucial in providing equitable college experiences for students with IDD. An essential part of attending college is developing friendships, which can be complicated for these students. Thus, programs like the Social Peers program can provide an opportunity for students with and without IDD to socialize in supportive and integrated environments.

**420.048 (Poster) Transportation Use and Barriers for Employed and Unemployed Autistic Adults**


**Background:** Autistic adults are significantly unemployed or underemployed even compared to other disability groups. Employment is a social determinant that, when satisfied, closely influences health-related quality of life. For autistic adults, limited transportation options are a primary barrier to employment and independence as it limits employment opportunities. This study provides a closer examination of the association between transportation use and employment status.

**Objectives:** To examine the use of different types of transportation and barriers to public transit by employed and unemployed autistic adults.

**Methods:** The data was from a large, statewide study conducted between May 2017 and June 2018 using the Pennsylvania Autism Needs Assessment (PANA), in which information about employment and transportation use was obtained from autistic adults who were residents of Pennsylvania. The study sample included 1120 autistic adults (Mage=28.03 years, SD=9.84; 70% men; 82% non-Hispanic white).
Results: Participants who were employed were more likely to drive themselves than those who were unemployed (45% vs. 21%, p<0.001), while they were less likely to take rides from others (62% vs. 75%, p<0.001) or use service transportation (11% vs. 18%, p=0.001). For barriers to public transit, identified that employed participants reported fewer barriers to public transportation than unemployed participants with a small effect size (1.98 vs. 2.54, d=0.22).

Conclusions: Employed autistic adults exercise more transportation independence. Unemployed autistic adults report more barriers to participation and less ability to independently use public transportation. Future transportation and employment studies are necessary.

420.049 (Poster) Treatment of Menopausal Vasomotor Symptoms (VMS) and Sensory Issues: A Case-Based Approach in a 53-Year-Old Caucasian Autistic Woman
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Background: Adult autistic women are still under-recognized (Rynkiewicz et al. 2019). Of more than one billion women aged 50 and over, it is unknown how many are autistic and experiencing menopause. Still considered a taboo topic in many societies, little research exists on how menopause affects autistic women’s health and well-being. Existing studies suggest this often-difficult transition period is associated with many unmet health needs, a frustrating lack of knowledge and support from healthcare professionals, and an absence of resources dedicated to this population (Karavidas &Visser 2022; Rynkiewicz et al. 2022; Moseley et al., 2021). Menopausal vasomotor symptoms (VMS), or hot flashes and night sweats, are cardinal symptoms of menopause. While VMS are experienced by the majority of women during menopause, in autistic women such symptoms may intensify and worsen sensory sensitivities (Groenman et al. 2022).

Recently, more adult women without intellectual disability have pursued a formal autism diagnosis to define their own autistic identity. This often helps them learn to more effectively recognize warning signs of sensory difficulties and meltdowns, and can lead to the self-discovery of unexpected strength, resilience, and confidence in advocating for their needs.

Objectives: to investigate menopausal VMS experienced by an autistic woman and examine whether symptoms are linked to autistic traits and sensory issues.

Methods: This case-study describes a 53-year-old Caucasian autistic woman without intellectual disability, diagnosed at age 43 by a trained psychiatrist, and currently experiencing menopausal symptoms. Anxiety and depression were previously recorded and treated pharmacologically, but she currently has no other comorbidities or somatic illnesses, and was not taking medication at the start of recording. Tests completed include: the ADOS-2 (Module 4) and ADI-R; a modified version of the Girls Questionnaire for Autism Spectrum Condition for adult women (Brown et al. 2020), focusing on sensory difficulties and profile; the Social Communication Questionnaire (Lifetime scale); the Autism-spectrum Quotient; and the Menopause-Specific Quality of Life Questionnaire, measuring vasomotor, physical, psychosocial, and sexual menopausal symptoms. Gynecologic and hormonal lab testing were also conducted. Hormone replacement therapy (HRT) was introduced to ameliorate symptoms of estradiol and progesterone deficiency.

Results: Over a period of 7 months after HRT implementation, hot flashes, night sweats, foggy thinking, vaginal dryness, mood swings and anxiety decreased. Strong sensory issues were linked to more severe VMS. A healthy Mediterranean diet, physical outdoor exercise and mindfulness practice were implemented in the patient’s daily routine for potential positive effects on well-being. Standardized assessments confirmed ASD diagnosis and the presence of sensory difficulties.

Conclusions: Intensity of VMS symptoms were observed in relation to strength of sensory issues, as found by Groenman et al. (2022). Sensory perception and intellectual processing appear to influence how VMS symptoms are interpreted, labeled, and reported. Since gynecologists often lack fundamental knowledge on ASD, this highlights the need for further research to inform treatment plans, including HRT and non-pharmacologic approaches that could be offered to autistic women during menopause.

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Background: Prior research has tabulated preferences for identity- or person-first language amongst persons with an autism diagnosis (e.g., Kenny et al., 2016). The current study differs from this previous body of research by examining quantitative predictors of language preferences. Utilising a social identity theoretical approach (SIA, Dirth & Branscombe, 2018), the current research investigates whether the centrality of an autism identity to the person reported in qualitative literature (e.g., Botha et al., 2020) leads to participants embracing terms
that prioritizes their identity (e.g., identity-first terms) and reject terms that distance their self from the diagnosis (e.g., person-first terms). Additionally, within SIA approaches, threats (e.g., stigma, discrimination) to minority group identity can lead to attempts by ingroup members to distance themselves from or hide aspects of their identity (Barreto & Ellemers, 2011). Thus, greater experiences or internalisation of stigma may lead participants distance themselves from their threatened minority groups status, by preferring terms that downplay autism (e.g., person-first terms). Finally, qualitative research suggests that how and where one learns about autism and the quality and nature of information provided, can be an important part of how one develops and expresses an autism identity (MacLeod et al., 2013; Riccio et al., 2021). Thus, we would posit that those who have more accurate and less stigmatised autism knowledge, would be more immune to negative autism stereotypes, and express this through the endorsement of identity-first language.

Objectives: This current study investigated psychological and social factors that might underlie language use and preference within the autistic community, specifically whether autism knowledge, internalised stigma, and autism identity predict participants preference for, or the offensiveness of autism labels.

Methods: 198 Australian adults with a formal diagnosis of autism ($M_{age}$=34.89; 29.3% male; 56.1% female, 14.6% non-binary) were recruited to an online survey via email and social media. Participants rated on a 7-point Likert scale their preference for, and the offensiveness of, four person-first (Person with Autism, Person on the Autism Spectrum, Person with ASD, and Person with ASC) and two identity-first autism terms (Autistic, Autistic Person). Participants also completed measures of autism knowledge (Gillespie-Lynch et al., 2015), experiences of stigma (Ritsher et al., 2003), and autism identity (Leach et al., 2008), as well as demographic variables.

Results: Regression results (Table 1) indicated a stronger autism identity was associated with a greater preference for identity-first terms and finding these terms less offensive. Contrastingly, stigma was associated with finding identity-first language less favourable and more offensive. Interestingly, a more recent diagnosis was associated with finding identity-first terms less offensive. Preferences for or offensiveness of person-first terms was not explained by the autism knowledge, internalised stigma, and autism identity variables.

Conclusions: These findings add to the discussion about language preferences in autism. Findings suggest decision making around identity-first language is influenced by a strong sense of autistic identity, experiences of stigma, and timing of when participants received their diagnosis.

420.051 (Poster) Understanding Motivation Regulations to Physical Activity in Young Adults with Autistic Traits

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Background:

Individuals with autism spectrum disorder (ASD) are often less physically active and engage in more sedentary behaviors than their peers without autism (Kuo et al, 2014; Soden et al, 2012). Specifically, individuals with ASD engage in physical activity (PA) less frequently and at lower intensity and duration levels than their neurotypical peers (Gehricke et al., 2020; Hillier et al. 2020; Stanish et al., 2017). Self-determination theory (SDT; Deci & Ryan, 1985) provides a lens to examine the different motivations behind why a person does, or does not, engage in a behavior. As such, SDT is appropriate for understanding the motivations behind PA engagement (Hamm & Kim, 2018).

Objectives:

Motivation to engage in PA was examined quantitatively and qualitatively in young adults with autistic traits. Giving a voice and first-hand account to young adults with autistic traits can result in deeper understanding of the motives behind PA engagement.

Methods:

Thirty young adults (43% white, 67% identified as female) participated in an online survey. Table 1 has all demographics. Participants completed the Social Responsiveness Scale-2 (SRS-2, Constantino & Gruber, 2012) to assess for the presence of autism traits. This sample was taken from a larger study and only included participants scoring above threshold on the SRS-2. SRS-2 raw scores above 69 can be used clinically to recommend screening for autism and has been previously used in underdiagnosed populations (e.g., females; Hull et al., 2020; Lai et al., 2017). Additional measures included the Behavioral Regulations in Exercise Questionnaire – 3 (BREQ-3; Cid et al., 2018) used to assess self-determination across amotivation, external, introjected, integrated, and intrinsic regulation subscales, and self-reported physical activity frequency, duration, and intensity (see Table 2). An open-ended question was also provided: “What motivates you to engage in physical activity?”

Results:

Young adults with autistic traits engaged in PA on average 3 days per week, for 40-minute intervals, and at moderate intensities (Table 1). In addition, this sample showed higher introjected and identified self-motivation regulations and were less motivated by amotivation and
external regulations (Tables 1 & 2). Qualitative analysis of the open-ended question validated the BREQ-3: young adults (39%) provided anecdotes of being motivated by identified regulations. However, an additional theme emerged that suggested motivation was rather multi-faceted and was dependent on context and situation (Table 2).

Conclusions:

The findings underline the need to assess the various factors which motivate an individual with autism traits to engage in PA. PA behaviors in adults with autistic traits are on par with meeting PA guidelines (at least 150 minutes/week of moderate-vigorous PA). Both the BREQ-3 scores and qualitative responses suggest that young adults with autism traits are highly motivated by identified regulations. Identified regulations are based on conscious values that are personally important. Results suggest that identifying the benefits and positive outcomes of PA (i.e., mental and physical health benefits) may be more likely to motivate a person with autism traits to participate in PA than to gain an external reward or avoid a punishment (i.e., external regulation).

420.052 (Poster) Self and Caregiver-Reported Changes in Positive Affect during the Transition to Adulthood Among Male and Female Autistic Adults

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Background: The transition to adulthood is a period of uncertainty for many autistic individuals. They frequently experience challenges in obtaining and maintaining normative adult outcomes such as employment (Clarke et al., 2021) and independent living (Dudley et al., 2019), and report high rates of loneliness (Schiltz et al., 2021) and internalizing symptoms (Hollocks et al., 2021), with evidence that autistic females may experience adulthood differently than males (Taylor & DaWalt, 2020). To better promote positive transitions, characterizing happiness and well-being during adolescence and adulthood is an essential pursuit.

Few studies have examined caregiver- and self-reported internal states across time in this population from a strengths-based perspective (see Pelicano et al., 2022). As autistic individuals are increasing their relative independence during the transition to adulthood, we aim to examine the consistency in patterns of positive affect across reporters for men and women on the spectrum.

Objectives: The current study explored 1) concordance between self- and caregiver-report positive affect during the transition to adulthood, (ages 15-29), 2) change in self-reported and caregiver-reported positive affect in autistic individuals and 3) changes across time by participant gender.

Methods: Participants (n = 42; 21% female) were drawn from a longitudinal cohort followed from age 2 through adulthood. Participants and their primary caregivers (reporting on participants) completed the Positive and Negative Affect Scale (PANAS; Watson et al., 1988) up to five times (ages 15, 20, 23, 25, 29). Correlations were used to examine associations across reporters at multiple ages, and multilevel modeling was used to examine PANAS positive subscale composite score across time and by gender.

Results: Correlations between caregiver-reports and self-reports on positive affect revealed varying patterns of associations across time. Between 15 and 19 years old, self-report and caregiver report agreement was low (r = 0.12). However, there was significant agreement between ages 19 and 21 (r = 0.30**), 21-24 (r = 0.42***), and 24 and 30 (r = 0.23**).

Multilevel modeling revealed a significant main effect of age, indicating a negative slope in self-reported positive affect from age 15 to 30. There was also a significant interaction effect of gender and age, which indicated the slope for female participants (b = -1.10) to be steeper than the slope for male participants (b = -0.31).

Using caregiver-reported data, we found only a marginal main effect of age, and a significant interaction with gender. Simple slopes revealed a small negative slope for male participants across time (b = -0.19), but a significant positive slope for female participants across time (b = 0.53).

Conclusions: We found declines in positive affect over time using both self- and caregiver-reports. Despite our small sample size, we found moderate concordance between self- and caregiver-report positive affect which varied as a function of participant age during adulthood. We identified divergent patterns of change across time for autistic women by reporter, with self-report indicating more negative slopes than men, and caregiver-report indicating positive slopes. Findings indicate a need to consider the experiences and perspectives of autistic women during the transition to adulthood.

420.053 (Poster) The Role of Social Competence in Achieving Normative Adult Outcomes

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Background: An autism diagnosis does not preclude the ability to engage in meaningful, adaptive social behaviors. Though some socially-impairing aspects of ASD—such as narrative skills, prosody, and eye contact—may be resistant to change, individuals with autism can display social competence through other behaviors such as sharing, cooperation, and use of emotional coping skills. Strengths in aspects of social functioning not directly associated with core features of autism could promote positive developmental cascades for autistic individuals. However, little work has replicated longitudinal findings from the general population that adolescent social competence predicts positive adult outcomes in ASD. The current project sought to characterize social competence in ASD and examine associations between adolescent social competence and normative adult outcomes.

Objectives: 1) Characterize social competence trajectories as measured by VABS social age equivalence (AE) scores from ages 2-26, 2) examine convergence between VABS social-AE trajectories with two measures of social competence collected in early adolescence—the Social Skills Questionnaire (SSQ), and the prosocial domain of the Strengths and Difficulties Questionnaire (SDQ), and 3) examine the utility of scores from age 14 for all three social competence measures in predicting work, friendship, and romantic outcomes in adulthood.

Methods: 253 adults with ASD were drawn from an ongoing longitudinal study. The VABS was administered 8 times from ages 2-26. The parent- and self-report SSQ and teacher-report SDQ were administered at approximately age 14. Employment, friendship, and romantic relationship data were compiled from self- and parent-report demographic forms. Group-based trajectory modeling was used to identify trajectories in social competence development as measured by the VABS social domain. Multilevel modeling was used to investigate convergence between SSQ and SDQ scores from adolescence and VABS social-AE trajectories. Logistic regressions were used to examine the predictive validity of VABS, SSQ, and SDQ scores from age 14 for normative adult outcomes.

Results: We identified two patterns of social competence development: a low trajectory characterized by slow linear gains throughout childhood and plateauing in adulthood, and a high trajectory characterized by steeper linear gains in childhood followed by decline in adulthood. Multilevel modeling indicated that caregiver-report and self-report SSQ scores from adolescence and non-verbal IQ at age 9 were associated with faster growth in Vineland Social-AE scores for the High Social-AE trajectory group. In contrast, teacher-report SDQ prosocial scores from adolescence were associated with faster growth in Vineland Social-AE scores in all participants, regardless of trajectory group. Regression models indicated Vineland Social-AE scores significantly predicted employment and friendships in adulthood. SSQ total and SDQ prosocial scores also significantly predicted friendship in adulthood. Only non-verbal IQ at 9 predicted the likelihood of having ever had a romantic relationship.

Conclusions: These findings highlight the role of social competence in atypical and typical development and suggest day-to-day social behaviors may be distinct from the core social deficits traditionally associated with ASD. Future studies should continue to move towards a worthwhile definition of social competence in ASD and should leverage strengths-based approaches to define and examine meaningful adult outcomes in this population.

420.054 (Poster) The Understanding of Wrongfulness By Autistic Individuals When Interacting with the Criminal Judicial System
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Background:

Upon being arrested after engaging in criminal activity, either willfully or naively, autistic individuals have shown an inability to reason about the wrongfulness of their conduct. It has been argued that this inability to reason may reflect an inability to think about the impact one’s behaviour has on others, or appreciate that they had in some way been manipulated. This inability to appreciate the thoughts, feelings, and intentions of others – often referred to as poor Theory of Mind (ToM) – is thought to underpin many of the difficulties faced by autistic people and may lead to poor reasoning about wrongful behaviour.

Objectives:

The present study investigated the effect of autism, and theory of mind, on reasoning ability, and whether this effect was weakened when explicit information was given about the intentionality behind, and harmful outcome of, a behaviour. It was hypothesised that when explicit intent and harm information were absent, ToM would mediate the autism and reasoning ability relationship.

Methods:

The reasoning ability and ToM of 37 autistic and 48 non-autistic participants was assessed. To test reasoning ability, participants read criminal scenarios with intent and harm information absent or present and reasoned why the behaviour was/was not ‘wrong’. Participants’ reasons were then scored by the level of intent and harm information used in their responses.

Results:
Although autistic individuals scored lower for reasoning ability than non-autistic individuals, ToM did not mediate this relationship when information about intent and harm was not provided. The estimated difference in reasoning ability was smaller between the groups when harm information (harm-only and harm & intent) was present compared to when it was absent (intent-only and neither).

Conclusions:

The poorer reasoning ability of autistic people suggests they may not readily think about the intent or potential harm to others when engaging in illegal behaviours or confronted with wrongful situations. However, if informed about the potential harm and intent, the difficulties experienced by autistic people are reduced suggesting that anticipating the potential outcome may not be intuitive for some autistic people and education is required for the autistic person, as well as non-autistic persons who may be involved in making judgements in such matters.

420.055 (Poster) The Influence of Remorse on How Autistic People Are Perceived and Punished in the Criminal Judicial System

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Background:

Research indicates that individuals with autism spectrum disorder receive harsher penalties when charged with the same crime as their non-autistic peers. e search also indicates that diagnostic features of autism such as flat affect, inappropriate emotional reactions, and poorly integrated verbal and nonverbal communication may reduce one’s ability to either feel remorse or if felt, convey that emotion. Given remorse plays a key role in sentencing, of interest in the present study was whether autistic individuals on the were perceived as demonstrating less remorse than their non-autistic peers when accused of the same crime, and whether this led to harsher penalties.

Objectives:

The aim of this study was to determine whether non-autistic participants would apply harsher penalties to autistic defendants and whether this relationship was affected by the amount of remorse shown. Also considered was whether education would mediate any observed relationship between penalty harshness and perceptions of remorse.

Methods:

Five autistic and five non-autistic individuals took part in video recordings and were instructed to convey remorse for two proposed crimes. Non-autistic participants (N = 195) were then randomly allocated one autistic video and one non-autistic video and asked to indicate how remorseful they perceived each individual to be and the degree to which each person should be penalised. Education was then administered, informing participants of autistic characteristics, and participants were given the option to re-rate perceived remorse and penalty harshness.

Results:

Results revealed that perceived remorse mediated the relationship between autism diagnosis and penalty harshness. Further, education resulted in a reduction on the harshness of the penalty imposed, through improving perceptions of remorse.

Conclusions:

These results provide evidence that autistic individuals may be unfairly disadvantaged within the forensic setting due to difficulties or differences in displaying remorse. However, the administration of education regarding autism may negate these adverse outcomes, thus highlighting the importance of educating decision makers on potential differences in autistic presentation.

420.056 (Poster) “I Can’t Relate to It”: Exploring Autistic and Neurotypical Adults’ Perceptions of the Australian Physical Activity and Sedentary Behaviour Guidelines

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Background: Despite sufficient participation in physical activity being strongly associated with better health outcomes, 56 per cent of the Australian population do not meet the Australian Physical Activity and Sedentary Behaviour Guidelines (the Guidelines). These Guidelines are available in the Make Your Move - Sit Less, Be Active for Life! brochure, and were designed to educate the public about the recommended levels of weekly activity needed for health benefits. Autistic adults have poorer health outcomes and participate in even
lower levels of physical activity when compared to neurotypical adults. The perceptions of the *Guidelines* by the Australian neurotypical and autistic population is unknown.

**Objectives:** The objective of the current study was to explore and compare autistic and neurotypical adults’ perceptions of the *Australian Physical Activity and Sedentary Behaviour Guidelines*.

**Methods:** The current study used a qualitative research design, interviewing 15 autistic and 20 neurotypical adults. An interpretative phenomenological analysis approach was used to collect and analyse the interview data.

**Results:** The findings between the two groups were largely similar and data were combined. Four themes were identified during data analysis. These included: 1) **Lack of Awareness and Engagement with the brochure containing the Guidelines**, whereby the participants were unaware of the existence of the material, and found the information not engaging. 2) **Misinterpretation of Key Terms and Concepts**, whereby participants misunderstood the terms related to different levels of physical activity. 3) **Relevance and Relatability of the Brochure and Guidelines**, whereby participants did not feel the material was relevant to them because of the illustrations used. 4) **Lack of Inclusivity**, whereby participants noted the guides were written from an ablest perspective.

**Conclusions:** The findings of the two groups were largely similar and they suggest that health promotion materials would be more visible, clear, inclusive and engaging for neurotypical and autistic Australians. The public’s perception of the *Guidelines* should be considered in the future development of health promotion materials. This study has implications for considering how to improve the number of people meeting the *Guidelines*. To the authors knowledge, this is the first study to consider how autistic adults perceive the health promotion Guidelines. The autistic participants advocated for the use of more inclusive messaging to create more relatable health promotional content. The study’s findings suggest the brochure needs to remove ableist language and include information and examples relevant to adults with an impairment. Further research is needed to evaluate how differences in interpretations impact the application of the *Guidelines* and how this could be used to foster sufficient participation in physical activity.

**420.057 (Poster) The Impact of Physical Activity on Mood for Autistic Adults**

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**Background:**

Autistic adults appear to be at greater risk of experiencing mental health comorbidities than that of their non-autistic peers. Depression and anxiety are among the most prominent mental health conditions within the autistic community. There is robust evidence purporting the benefits of physical activity on mood for the non-autistic population. Consequently, physical activity is often suggested as an early intervention or preventative strategy for non-autistic adults. However, there is limited evidence outlining the impact of physical activity for autistic adults.

**Objectives:**

The objective of this study was to explore the experience and impact of physical activity on mood for autistic adults.

**Methods:**

This study was conducted using semi structured interviews in an Interpretative Phenomenological Analysis (IPA). The IPA research process has been demonstrated to be effective in the autistic population and is suited to small samples. A total of 11 individuals participated in the study, six females and four males (one person did not disclose their gender). Semi-structured interviews were conducted online. Interview topics included preferred types of physical activity, the influence of physical activity on mood, their sleep and eating patterns, as well as sensory and environmental preferences. Interview questions were reviewed by an autistic research reference group prior to the study to ensure suitability for the target population. The interview transcripts were analysed using the seven stage IPA framework.

**Results:**

Four themes being identified: 1) **The right physical activity has a purpose**, participants noted that completing physical activity provided them with a sense of achievement. 2) **Exercising with people can make a difference**, participants acknowledge that when completing social sports where they were surrounded by people with similar interests, was motivating and encouraging. 3) **Fitting physical activity into everyday routine**, the routine of physical activity was identified as a common idea expressed by the participants that would impact their mood towards physical activity and the reason why they engaged in it. 4) **The body and mind’s response to physical activity**, participants commented that they do not like “sweating”, “being out of breath”, “red in the face” or “in pain” following exercise. These preferences affected the intensity of their physical activity as these physiological responses would significantly influence their emotional state.
Conclusions:

These findings highlight that physical activity can improve mood for autistic adults. However, the impact of physical activity on the mood for autistic adults appeared to be dependent on their perception of ‘having a good or bad day’ and the type of physical activity completed. Positive effects on mood from engaging in physical activity on a perceived good day were reported by participants. This resulted in feelings of accomplishment and purpose, social opportunities provided and increasing motivation. Conversely, physical activity was not reported as having a significant impact on mood during self-perceived bad days. These findings can provide insight into how mood can impact autistic adults and would benefit from further research investigating and supporting the mental health of the autistic community.

**420.058 (Poster) Seeking and Receiving Support for Mental Health and Suicidal Behavior: A Qualitative Study of the Experiences of Autistic Adults in Australia**

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Background: Autistic adults experience high rates of co-occurring mental illness, including major depressive disorder, anxiety disorders, self-harm and suicidal behavior, with risk of death by suicide about three-times that of the general population (Santomauro et al., 2022). Effective support for mental health is therefore a priority for the autistic population (Gotham et al., 2015). To date only a few studies have examined the experience of autistic adults seeking support for their mental health concerns. In this study, we interviewed autistic adults living in Australia who had all experienced significant mental health challenges associated with suicide, about their experiences seeking support for their mental health.

Objectives: To examine participants’ experiences seeking and accessing support for mental health, supports and coping strategies, including for when they were feeling suicidal, quality of care (what worked, what did not), and recommendations for improving services.

Methods: Ethics approval for the study was received from the La Trobe University Human Research Ethics Committee. The research methodology we adopted was based on an integrated co-design approach (Kerr et al., 2022). Thirty-three (16 women, 14 men, 3 nonbinary) autistic adults aged 21–68 years ($M_{age}=41.72, SD=11.49$ years) participated in a phenomenologically informed one-to-one semi-structured interview conducted over Zoom. Interviews lasted up to 60 minutes ($M=46.53, SD=10.03$ minutes, $Range=22–67$). All individuals had previously participated in a longitudinal study and had consented to be contacted; all provided informed consent prior to commencing the interviews. We utilized a targeted strategy to recruit participants with a higher likelihood of having accessed mental health services or of seeking support for their mental health associated with suicidal behavior. We achieved this by inviting participants based on prior responses to the Columbia-Suicide Severity Rating Scale (C-SSRS; Posner et al., 2011) or Suicidal Behaviors Questionnaire-Revised (SBQ-R; Osman et al., 2001). We analyzed interview data using applied thematic analysis (Guest et al., 2012).

Results: Twenty-five (76%) participants reported a history of suicidal behavior (i.e., C-SSRS actual, interrupted, or aborted attempt, preparation) and a lifetime history of suicide plan or attempt (i.e., SBQ-R, item 1). Thematic analysis revealed three main themes: Barriers to accessing services (including financial barriers, finding appropriate services as an adult, and gate-keeping of services preventing access); Difficulty in finding services that were understanding of the autistic context and autistic lived experience (e.g., assumed incompetence in activities of daily life, disregarding individualization and lived experience when formulating treatment or safety plans, lack of sensory accommodations); and Difficulties in finding a “good fit” for both mental health clinician/s and therapies (e.g., a perceived high level of clinician knowledge of autism but a low level of understanding of the impact of autism on communication and on the effectiveness of therapies, clinicians recommending a symptomology-based “one-size-fits-all” approach, therapies “not working like they do for other people”).

Conclusions: Our findings demonstrate an urgent need for improvement in both access to mental health services and service provision for autistic adults. We provide specific recommendations based on the insights gained from examining the lived experience of autistic people.

**420.059 (Poster) Transitioning Autistic Adults into the Workforce: Economic Impact and Implementation of a Workplace-Based Health and Wellbeing Support Program**

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Background: Autistic people experience poor outcomes in adulthood. Two significant transition “cliffs” have been identified post-secondary school and higher education. Autistic people transitioning into the workforce have difficulty finding employment, particularly employment matched to their skills, interests, and level of education. This results in broad costs to society associated with lost revenue, or
low return on investment (e.g., associated with education investment). Recently, various industries have instigated autism targeted employment programs which support transition to work. Research is required to evaluate the viability and sustainability of these programs, as well as potential impacts on program participants.

Objectives: To a) quantify the economic impact of supported employment programs, b) identify impacts on individuals participating in these programs, and c) introduce a novel autism workplace-based health and wellbeing support program.

Methods: We examined data from 56 autistic adults ($M_{age}=25.28, SD=8.36$ years) participating in a competitive entry 3-year government and private enterprise collaborative supported employment program. These data were used to develop a cost-benefit analysis (CBA) modelling savings to the government. Participants were followed-up at the conclusion of the program and optimal outcomes (i.e., transition into open employment) were evaluated. Based on follow-up data from 43 autistic adults ($M_{age}=27.50, SD=9.63$ years) participating in the program, we report changes over 12-months to daily living, social support, job satisfaction, depression, anxiety, and well-being.

Results: The unemployment rate prior to entering the program was 66%. Retention in the program over year 1 was >98%. Follow-up revealed 49 (87.5%) participants had transitioned into open or alternative employment post-program, reflecting an unemployment rate of 16%. Net benefits of the program to government equated to AUD$34,927 per participant after 3-years, and AUD$618,151 cumulative benefit per participant after 20-years. In terms of health and wellbeing outcomes, there was a small but significant increase in daily living skills, $t(35)=-1.96$, BcA 95%CI [-1.78, -0.114], $d=0.31$ [-0.15, 0.78], and slight decrease in job satisfaction, $t(35)=2.11$, [0.243, 5.36], $d=-0.40$ [-0.87, 0.07]. No significant changes over 12-months were identified for any other mental health or wellbeing measure.

Conclusions: Our findings demonstrate the feasibility and benefits, both to the individual and society, of a supported employment program for autistic adults operating within the private and government sector. Specifically, we found that the program was reasonably successful in transitioning young, educated, but mostly unemployed or under-employed autistic adults into the workforce. Following 3-years, most participants had secured open employment, crediting the program with providing them a ‘stepping-stone’ into the workforce. This shift provided substantive savings to government, associated with avoided costs administering and funding programs, higher education loan repayment, income tax contributions, and reductions in pensions or unemployment benefits. Nonetheless, we did not see clear improvements to health and wellbeing, leading to the development of a new training program aimed at supporting autistic employees in the workforce. This program is currently being evaluated in a Randomized Control Trial (RCT) across various workplaces.

Animal Models

**POSTER SESSION — ANIMAL MODELS**

**408 - Animal Models**

**408.001 (Poster) A Novel Approach to Measure Emotional Empathy in Rats through Playback of Ultrasonic Vocalizations**

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**Background:** Difficulties in responding to and understanding the emotions of others, known as empathy, is characteristic of Autism Spectrum Disorder (ASD). Rodent models have been crucial in identifying neurobiological mechanisms underlying ASD. Despite their importance, the translatability of findings on treatments from rodent to human studies has been daunting. This is partly due to the often exclusive use of basic social tests that do not do justice to the complex behavioral expression of ASD.

**Objectives:** For these reasons, we developed a novel test of emotional empathy (i.e. mimicking the affective state of a conspecific) in rats. Rats are highly social and communicate via ultrasonic vocalizations (USV). In aversive situations (e.g. predator exposure), rats emit 22-kHz USV that presumably reflect a negative affective state. These USV serve as "alarm calls" and, in response, rats freeze or hide. In appetitive situations (e.g. social play), rats emit 50-kHz USV that presumably reflect a positive affective state. They serve as "social contact calls" and elicit approach behavior from the receiving rat. Hence, 22-kHz and 50-kHz USV are believed to induce a negative and positive affective state in the receiver, respectively. Our new empathy protocol builds on the distinct affect-inducing properties of USV and combines it with the acoustic startle response test. The acoustic startle response is a reflexive contraction of the body muscles in response to a loud noise burst and its intensity depends on the animal's affective state - i.e. intensified at a negative affective state and reduced at a positive affective state. Therefore, we tested whether playback of both USV types can alter the acoustic startle response bidirectionally – i.e. enhanced and reduced by 22-kHz and 50-kHz USV playback, respectively.
Methods: Juvenile male Sprague-Dawley rats (N = 16) were subjected to the acoustic startle response test on four subsequent days. On each day, playback of 22-kHz USV, 50-kHz USV, or their acoustic control stimulus was presented (order counterbalanced between rats). The effect of USV type on the maximum startle response was compared to their acoustic control stimulus within rats.

Results: Our results indicated that playback of 50-kHz USV significantly decreased the acoustic startle response by 37.91 – 52.17 % compared to its acoustic control across several startle stimulus intensities, suggesting that the rats successfully mimicked the positive affective state of the caller. Playback of 22-kHz USV did not significantly increase the acoustic startle response compared to its acoustic control possibly due to insufficient sound pressure levels.

Conclusions: We have developed a novel protocol that can measure positive emotional empathy in rats. The protocol differs from previous ones not only because of its focus on bidirectional modulation of empathy, but also because it does not require learning since it uses ethologically relevant stimuli (i.e. USV). Furthermore, because the protocol is not labor-intensive, it can easily be added to a standard social test battery for genetic rat models of ASD. This will help us understand the complex psychological mechanisms underlying the core symptoms of ASD and aid in the development of optimized treatment approaches.

408.002 (Poster) Abnormal CYP11A Metabolic Pathway and Offspring ASD Development and Vitamin D Intervention Study

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Background: Our previous results suggest that abnormal upregulation of CYP11A gene in placental trophoblast cells directly leads to overloading of mitochondrial biosynthesis and excessive peroxide (ROS), thereby inducing mitochondrial damage and apoptosis. Furthermore, we found that aberrant upregulation of CYP11A gene can lead to changes in the local microenvironment of trophoblast cells as well as the release of inflammatory factors, thereby indirectly damaging neural stem cells and inhibiting their proliferation; These results suggest that abnormal up-regulation of CYP11A1 gene in trophoblast cells may affect the development of fetal nervous system. In the course of the study, we also found that moderate vitamin D 3 intervention can effectively inhibit and reverse the damage of trophoblast cells, so as to rescue and restore the function of neural stem cells.

Objectives: To determine whether overexpression of CYP11A during pregnancy affects the neurodevelopment of the offspring and the development of autistic spectrum disorder (ASD). And we also aimed to investigate the effect of vitamin D supplementation during pregnancy on the intervention of ASD in the offspring and wish to provide a basis for the early prevention of clinical ASD.

Methods: Pregnancy overexpression CYP11A animal model (creation of mouse Cyp11a1 knockdown protein at the H11 locus in C57BL/6N mice by CRISPR/cas-mediated genome engineering) was constructed and validated at protein level. Vitamin D feeds (1000 IU/KG, 5000 IU/KG, 10000 IU/KG) were prepared. Maternal CYP11A(KI) overexpressing mothers were fed with different doses of vitamin D supplementation from the first day of bolus pick-up after cage ensainment; WT mothers fed with vitamin D supplementation at a dose of 1000 IU/KG as the control. The vitamin D diet was fed until the pregnant mice gave birth and the offspring were tested behaviorally at 6-8 w to detect the effect of vitamin D supplementation during pregnancy on the treatment of autistic spectrum disorder.

Results: Social competence was tested in the first phase of a three-box social behaviour experiment. Compared to exposure to an empty metal frame, WT submice (1000IU/KG) preferred contact with unfamiliar mice compared to KI submice (1000IU/KG) (WT:p=0.0093; KI(1000IU/KG):p=0.4442), while social behaviour of submice improved after the VD intervention during pregnancy (WT:p=0.0001; KI(1000IU/KG):p=0.0001). improved (KI(5000 IU/KG):p<0.0001; KI(10000 IU/KG):p<0.0001), and social novelty preference was tested in the second stage, with WT submice (1000 IU/KG) preferring to socialize with unfamiliar mice compared to exposure to familiar mice (WT:p=0.0248; KI(1000IU/KG):p=0.0616), whereas the social novelty preference of submice improved after the VD intervention during pregnancy (KI(5000IU/KG):p=0.0089; KI(10000IU/KG):p=0.5784). In the elevated cross experiment, anxiety was evident in KI subrats (1000 IU/KG) compared to the WT group (p=0.0355) and reduced after the VD intervention during pregnancy (KI(5000 IU/KG):p>0.9999; KI(10000 IU/KG):p=0.9067).

Conclusions: Abnormal up-regulation of CYP11A1 gene expression can lead to autistic behaviours in offspring compared to healthy controls, and appropriate amount of vitamin D3 intervention during pregnancy can effectively improve social competence and social novelty preference and anxiety behaviours in offspring mice, and reduce the occurrence of autism. This will provide a new idea for the early prevention of autism.

408.003 (Poster) An Assessment of the Translational Validity of Sustained Attention Tasks between Rodents and Humans

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Background: Our previous results suggest that abnormal upregulation of CYP11A gene in placental trophoblast cells directly leads to overloading of mitochondrial biosynthesis and excessive peroxide (ROS), thereby inducing mitochondrial damage and apoptosis. Furthermore, we found that aberrant upregulation of CYP11A gene can lead to changes in the local microenvironment of trophoblast cells as well as the release of inflammatory factors, thereby indirectly damaging neural stem cells and inhibiting their proliferation; These results suggest that abnormal up-regulation of CYP11A1 gene in trophoblast cells may affect the development of fetal nervous system. In the course of the study, we also found that moderate vitamin D 3 intervention can effectively inhibit and reverse the damage of trophoblast cells, so as to rescue and restore the function of neural stem cells.

Objectives: To determine whether overexpression of CYP11A during pregnancy affects the neurodevelopment of the offspring and the development of autistic spectrum disorder (ASD). And we also aimed to investigate the effect of vitamin D supplementation during pregnancy on the intervention of ASD in the offspring and wish to provide a basis for the early prevention of clinical ASD.

Methods: Pregnancy overexpression CYP11A animal model (creation of mouse Cyp11a1 knockdown protein at the H11 locus in C57BL/6N mice by CRISPR/cas-mediated genome engineering) was constructed and validated at protein level. Vitamin D feeds (1000 IU/KG, 5000 IU/KG, 10000 IU/KG) were prepared. Maternal CYP11A(KI) overexpressing mothers were fed with different doses of vitamin D supplementation from the first day of bolus pick-up after cage ensainment; WT mothers fed with vitamin D supplementation at a dose of 1000 IU/KG as the control. The vitamin D diet was fed until the pregnant mice gave birth and the offspring were tested behaviorally at 6-8 w to detect the effect of vitamin D supplementation during pregnancy on the treatment of autism.

Results: Social competence was tested in the first phase of a three-box social behaviour experiment. Compared to exposure to an empty metal frame, WT submice (1000IU/KG) preferred contact with unfamiliar mice compared to KI submice (1000IU/KG) (WT:p=0.0093; KI(1000IU/KG):p=0.4442), while social behaviour of submice improved after the VD intervention during pregnancy (WT:p=0.0001; KI(1000IU/KG):p=0.0001). improved (KI(5000 IU/KG):p<0.0001; KI(10000 IU/KG):p<0.0001), and social novelty preference was tested in the second stage, with WT submice (1000 IU/KG) preferring to socialize with unfamiliar mice compared to exposure to familiar mice (WT:p=0.0248; KI(1000IU/KG):p=0.0616), whereas the social novelty preference of submice improved after the VD intervention during pregnancy (KI(5000IU/KG):p=0.0089; KI(10000IU/KG):p=0.5784). In the elevated cross experiment, anxiety was evident in KI subrats (1000 IU/KG) compared to the WT group (p=0.0355) and reduced after the VD intervention during pregnancy (KI(5000 IU/KG):p>0.9999; KI(10000 IU/KG):p=0.9067).

Conclusions: Abnormal up-regulation of CYP11A1 gene expression can lead to autistic behaviours in offspring compared to healthy controls, and appropriate amount of vitamin D3 intervention during pregnancy can effectively improve social competence and social novelty preference and anxiety behaviours in offspring mice, and reduce the occurrence of autism. This will provide a new idea for the early prevention of autism.
Sustained attention is the ability to maintain focus over time, particularly to dull tasks. This cognitive ability underpins other more complex cognitive skills such as learning, planning, organizing, and working memory. These cognitive skills are often affected in autistics. Rodents can complete many neuropsychological tasks that have been designed for use with humans. Studies with rodents are very useful as they allow for the investigation of pharmacological, genetic, and neurobiological mechanisms that would be difficult or indeed impossible to study in humans. Sustained attention is commonly assessed in rodents using three tasks – the rodent Continuous Performance Task (rCPT), the Sustained Attention Task (SAT), and the five-choice CPT (5C-CPT). How well these rodent sustained attention tasks map to human sustained attention tasks was assessed.

Objectives:

The translatable of these three tasks between rodents and humans was assessed based on (1) methodological similarity between the rodent and human tasks, (2) similarity in performance across species, and (3) replication of results.

Methods:

A systematic review was conducted to find relevant rodent experimental papers on the rCPT, SAT, and 5C-CPT. Search terms were entered into EMBASE, Medline (R) ALL, and American Psychological Association PsychInfo databases on Ovid.

Results:

Included for review were 138 studies, including 21 with the rCPT, 90 with the SAT, and 27 with the 5C-CPT. The 5C-CPT was found to have high utility as a cross-species paradigm. The rCPT and SAT both require adaptation and further development to meet the high utility translatable benchmarks. The replication benchmark was difficult to assess due to the recent developments of the tasks, potential publication bias, and poor clarity in some reporting of results.

Conclusions:

The 5C-CPT is an excellent candidate for the measurement and analysis of sustained attention for cross-species research. This task would be ideal for sustained attention research with mice with autism-related gene mutations. In the future, improved data sharing, transparent results reporting, and standardization of research practices will promote translatability between rodent and human research, furthering our understanding of the neural mechanisms of sustained attention.

Animal Model of Autism Induced By Valproic Acid Combined with Maternal Deprivation: Effects on Inflammation and Oxidative Stress Parameters


Background: Autism spectrum disorder (ASD) etiology probably involves a complex interplay of both genetic and environmental risk factors, which includes pre- and perinatal exposure to environmental stressors. Indeed, rodents exposed prenatally to valproic acid (VPA) exhibit ASD-like behavior. Besides, recent studies have shown that maternal deprivation (MD), can interfere with the development of the central nervous system (CNS) and lead to biochemical and behavioral abnormalities compatible with ASD.

Objectives: This study aimed to analyze the effects of prenatal exposure to VPA, combined with MD, on locomotor and social behavior, oxidative stress parameters, and inflammatory state in the CNS and in the periphery.

Methods: Pregnant Wistar rats were injected with VPA (600 mg/kg) or saline (control group) on the gestational day 12.5. At birth, the VPA-exposed and SAL-exposed offspring were subdivided into two groups: MD and non-maternal deprivation, n=10-13/per group. MD occurred from the 1st to the 10th postnatal day (PND), where the litter was separated from their dams 3 h/day. On PND 30, male and female pups were tested for locomotor and social behavior; after, the animals were euthanized, and the brain tissues (cerebellum, posterior cortex, and prefrontal cortex) and blood were analyzed to inflammatory markers (tumoral necrosis factor-α (TNF-α), Interleukin (IL)-1, IL-6, IL-10) and enzymatic assays to evaluate the oxidative damage by carbonyl (Carb), dichlorofluorescein oxidation (DCF), nitric oxide (NO), and antioxidant defense by activity of glutathione (GSH), superoxide dismutase (SOD) and sulfhydryl concentration (SH).

Results: Young rats exposed only to VPA presented a lower social approach when compared to the control group. VPA+MD did not present the same deficit. No locomotor deficit was observed in any group tested. Regarding the inflammatory parameters, males exposed only to MD exhibited an increase in pro-inflammatory cytokines (TNF-α, IL-1, IL-6), both in the blood and in the cortex total. Females exposed only to VPA exhibited an increase in (TNF-α, IL-1, IL-6), both in the blood and in the cortex. On the other hand, animals exposed to VPA+MD showed only an increase in (TNF-α, IL-1, IL-6), in the blood (females) and IL-1 in the posterior cortex (males). Regarding
oxidative stress parameters, females exposed to VPA+MD presented an increase in DCF and/or NO and a decrease in antioxidant defense (SH or/and GSH or/and SOD) in all brain areas analyzed (cerebellum, posterior cortex, and prefrontal). On the other hand, males in the VPA and VPA+MD groups presented an increase in DCF and/or Carb and a decrease in GSH or SOD only in the cerebellum. Besides, exposition to MD or VPA alone promoted other small alterations sex- and brain area-specific. All analysis was made compared to the control group.

Conclusions: This study showed that while MD alters more inflammatory cytokines in males, VPA affects these same parameters in females. Combined exposition to VPA and MD could be toxic to female brains when we look at the oxidative stress parameters or protective to males when we look at the inflammatory response. In summary, this study shows sex differences responses in ASD at the molecular level.

408.005 (Poster) Blame Grandpa: Transgenerational Effects on Mouse Behavior Due to X Chromosome Epimutation

Background: Given that males are 4.2 times more likely to be diagnosed with Autism Spectrum Disorder (ASD) than females and that ASD individuals display impaired social interaction and restricted, repetitive behaviors, it is prudent to use animal models to investigate this male bias. The male bias in ASD has been proposed to be due to imprinted loci on the X chromosome and our lab possesses a transgenic mouse model of Xlr3, an imprinted gene on the mouse X chromosome. We have devised a breeding scheme whereby third generation male mice possess an epimutated X chromosome that is the direct result of impaired meiosis in their Xlr3 transgenic maternal grandfather. A cohort of 25, third-generation mice have been sent for behavioral testing at the UConn Murine Neurogenetics Behavioral Facility (MBNF). The tests selected correlate with ASD behaviors in humans.

Objectives: To determine if males with epimutated X chromosomes are behaviorally distinct from control animals. The presence of distinct behaviors would indicate that the epimutated X chromosome is responsible.

Methods: 10 outcross animals who have never been under the control of the Xlr3 transgene were selected as control animals. 15 animals were generated from the transgene containing strain and represent the experimental strain. Study animals were singly housed and transferred to the MBNF for behavior testing. The following behavioral tests were performed: Novel Object Recognition, Open Field, Tube Task, Water Escape, and Morris Water Maze. Statistical analyses were performed on the raw data using the program SPSS Statistics by IBM. Multivariate Analysis of Variance (ANOVA) was used to analyze Novel Object Recognition and Open Field tests while a univariate ANOVA was used for Tube Task and Water Escape tests. A repeated measures ANOVA was used for the Morris Water Maze. Data were graphed using GraphPad Prism 9 and are displayed as mean values using standard error of the means for error bars.

Results: In the Novel Object Recognition test, experimental animals spent more time interacting with the novel object than the control animals (p-value < .031). In the Open Field test, experimental animals moved faster in both the inner and outer rings than control animals (p-values .041 and .027, respectively). The Morris Water Maze was statistically significant across the 8 days of testing, whereby experimental mice were unable to find the hidden platform (p-value < .001). Experimental mice tended to win more challenges in the tube task than control animals (not significant). No differences were observed in the water escape task.

Conclusions: The novel object recognition results suggest that the experimental mice do not have cognitive and memory deficits as they are able to detect the novelty of an object. The experimental animals were more exploratory in the open field, suggesting they possess a low level of anxiety. The Morris Water Maze highlights spatial learning deficits for the experimental mice because they fail to learn the location of the hidden platform over the 8 days. Thus, epimutation of the X chromosome leads to experimental mice with behaviors that are discernibly different from control mice.

408.006 (Poster) Development of Social Preference in Zebrafish Larvae
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Background: Social abilities, like attention to faces, and joint attention are established very early in human infants. Children with autism display deficits in these abilities, often already at birth. Whereas sociability is difficult to investigate in mammals during early development the animal model zebrafish provides unique possibilities to explore the development of the social brain. Zebrafish larvae are hatched and exhibit basic locomotor and feeding behaviours already some days after fertilisation. However, they do not interact with each other until almost a month of age, providing the opportunity to use various experimental approaches to decipher the neurobiology underlying the development of social preference.

Objectives: To describe how social preference behaviour develops during the first weeks of age in zebrafish larvae, and to what extent this development is associated with levels of monoamines and oxytocin.
Methods: Social preference was investigated using a three-chambered test arena for sociability in >300 larval zebrafish larvae at approximately one to five weeks of age. Information about the developmental stages, and tissue for HPLC and QPCR were collected.

Results: The social preference behaviour was not present at the second week, appeared at the third week, and increased considerably at the fifth week of age. There was also a substantial increase in the levels of the monoamines dopamine and serotonin, but not noradrenaline, between the second and third week of age.

Conclusions: Our results suggest that zebrafish can be easily used to investigate the initiation and development of social preference. Since there is a large number of molecular and genetic tools available that can be used for investigations of the nervous system of zebrafish, this may have large impact on our future understanding of the pathophysiology of autism. So far, our data indicate that serotonin and dopamine may be involved in the early development of attention to social stimuli.

408.007 (Poster) Developmental Vitamin D-Deficiency Produces Autism-Relevant Behaviours and Gut-Health Associated Alterations in a Rat Model
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Background:

Vitamin D-deficiency during pregnancy (here we refer to as Developmental Vitamin D (DV D)-deficiency), is an epidemiologically established risk factor for autism. Studies have also shown alteration of gut microbiome and gut dysfunction in autistic children and in animal models of autism such as Maternal Immune Activation (MIA). Our lab was the first to develop a preclinical model of DVD-deficiency in rats to study the effect of vitamin D-deficiency on brain development and behaviour. Vitamin D has broad physiological effects in brain, gut and immune system. A recent study from our lab has shown some behavioural phenotypes and immune alterations related to autism. The current study is motivated by findings showing similar behavioural phenotypes and neurobiological implications of validated animal models of autism such as MIA and our DVD-deficiency rat model. Thus, the goal of our study is to generate data that could link behavioural deficits and gut health in our model relevant to autism.

Objectives:

The current study aims to examine a broad range of autism-relevant behavioural phenotypes and impacts on gut health/microbiome induced by DVD-deficiency.

Methods:

DVD-deficiency was induced by placing four-week-old outbred female Sprague-Dawley rats on standard casein AIN93G rodent chow without any added vitamin D (0 IU Cholecalciferol) or control diet (added 1000 IU Cholecalciferol) for six weeks. Then, the females were mated, with the resulting pregnant dams remaining on DVD-deficient diets or corresponding control diets throughout pregnancy, birth of pups and until weaning postnatal day 21 (P21). At weaning, dams were euthanized and the pups remained on their maternal diet until P35. Assessment of maternal care was conducted from P2-P6, pup ultrasonic vocalizations and pup retrieval task were measured at P7 and P9. Social play behaviour was assessed at P35 in adolescent rats. After social play behaviour, animals were euthanized and tissues collected for experiments.

Results:

DVD-deficient rat dams exhibited altered postnatal maternal care. DVD-deficient pups at P9 showed increased ultrasonic vocalizations and in adolescence (P35), decreased social play and increased repetitive self-grooming behaviour. There were significant impacts of DVD-deficiency on offspring gut health as demonstrated by altered microbiome composition and diversity, correlation of bacterial abundance with social play behaviour, decreased villi length, and increased ileal propionate levels.

Conclusions:

Our animal model of this epidemiologically validated risk exposure for autism shows an expanded range of autism-related behavioural phenotypes and now alterations in gut microbiome that correlate with social behaviour. This model remains informative for studying autism-relevant brain and gut mechanisms.

408.008 (Poster) Dissecting Cortical Circuits Driving Motor Deficits in a Mouse Model of DDX3X Syndrome
Background: Many individuals with autism spectrum disorder (ASD) present with motor problems, although the relationship between ASD and motor ability is poorly understood. DDX3X syndrome is a monogenic form of ASD that affects primarily females and presents with significant motor involvement, including hypotonia and/or hypertonia, abnormal gait, and movement disorder. DDX3X syndrome is caused by mutations in the X-linked RNA helicase DDX3X, known to regulate mRNA metabolism. DDX3X is key for the development of the neocortex and hindbrain, but how it impacts the formation and function of brain circuits is unknown. To date, the brain circuits underlying the motor phenotype in DDX3X syndrome have not been explored. Our lab generated a Ddx3x haploinsufficient mouse (Ddx3x+− females) with construct and face validity for loss-of-function mutations. Ddx3x+− females have motor delays and deficits, and a misplacement of subcerebral projection neurons (scPNs) in primary motor cortex, which are neurons important for motor function. One type of scPN that we believe is particularly vulnerable to Ddx3x mutations is the corticopontine projection neurons, a population critical for motor control as these neurons initiate the cortico-ponto-cerebellar pathway connecting the cortex with the cerebellum.

Objectives: My project seeks to identify the cortical circuits driving motor deficits in Ddx3x+− mice. My objective specifically is to use in vivo viral tracing and transcriptomics to identify the neural substrate of motor deficits at the circuit, cellular and molecular levels, with the goal of ameliorating motor deficits using chemogenetics. Understanding the role of DDX3X in motor circuits will help decipher the relationship between ID and motor function, while defining objective readouts for pre-clinical testing of novel therapeutics.

Methods: I first investigated corticopontine circuits by injecting a retrograde virus carrying GFP into the pontine nuclei, a region important for motor behavior and innervated by scPNs. I then performed rotared and balance beam motor tests and stained for the immediate early gene c-Fos to investigate whether the corticopontine neurons are activated by the tasks. I also performed developmental and adult motor tests on a forebrain-specific line (Emx1-Ddx3x) to determine the role of the cortex in motor function. Lastly, I perform RNA-sequencing and proteomic analyses on Fluorescence-Activated Cell Sorting (FACS) purified corticoponine neurons from Ddx3x+− mice and control mice.

Results: My results show that execution of skilled motor tasks elicited neural activity in the cortex of control mice, however, the c-Fos+ cells did not significantly overlap with corticopontine neurons. Additionally, Emx1-Ddx3x mutant mice show developmental delays and adult motor deficits. Transcriptomic and proteomic experiments are ongoing.

Conclusions: These deficits in cortical development in Ddx3x+− mice provide basis to dissect the neural substrates of motor deficits observed in DDX3X syndrome with primary emphasis on the cortex.

408.009 (Poster) Effects of a Gut-Selective Integrin-Targeted Therapy in Mice Exposed to Early Life Immunostimulation, a Model for the Study of Autism Spectrum Disorders
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Background: Inflammatory and immune changes are recognized as pivotal mechanisms in ASD, particularly those involved in gut mucosal immune response. Few data are so far available upon the selective contribution of mucosal immune dysfunction to behavioral and neuroinflammatory profiles in mouse models for the study of ASD.

Objectives: To clarify the role of gut mucosal immunity on behavioral and neuroinflammatory profile in ASD, we used the early-life immune activation (EIA) mouse model. It is a double-hit model, including both prenatal (Poly I:C, mimicking a gestational viral infection) and postnatal (LPS mimicking a bacterial infection) immune challenges.

Methods: In male C57BL6/J EIA adult male offspring we evaluated the effects of i.p. administration of a monoclonal antibody directed against the integrin alpha4 beta7 (DATK-32: rat antimouse-α4β7 Ab), responsible for lymphocyte trafficking in the gut mucosa. The anti-α4β7 Ab causes a selective blockade of gut-experienced lymphocyte traffic to intestinal lamina propria. The effects of the treatment were assessed on EIA behavioral and neuroinflammatory profile, and gut immune-inflammatory changes.

Results: EIA male mice show a significant increase of colonic tissue IL-17A mRNA content when compared with controls. Cytofluorimetric analyses of lymphocytes isolated from mesenteric lymph-nodes (MLN) and spleens show in EIA mice increased percentage of CD8-(CD4+) α4+β7+ IL-17+ lymphocytes in MLN and of CD8-(CD4+), α4+β7+ IL-17+ and IFN-γ+ lymphocytes in the spleens. Treatment with anti-α4β7 Ab was associated with colonic tissue IL-17mRNA content and percentage of CD8-(CD4+) IL-17+ and IFN-γ+ α4+β7+ lymphocytes comparable to control mice. The anti-α4β7 Ab treatment rescued the social novelty deficit shown by EIA male mice in the three-chamber tests and improves the EIA-male mice rotarod impairment. EIA behavioral effects were associated with a proinflammatory profile in the hippocampus and prefrontal cortex of male offspring (significant increase in the mRNA expression of the proinflammatory cytokine IL-6 and IL-1 β), not modified by anti-α4β7 Ab treatment.
Conclusions: Amelioration of the gut inflammatory status obtained by a pharmacological agent acting exclusively at gut level, ameliorates some ASD behavioral features (e.g., response to social novelty and motor coordination skills), not necessarily interfering with the neuroinflammatory status. Once confirmed, these results of a behavioral rescue following normalization of gut inflammation in a mouse model for ASD study, could pave the way for a therapeutic strategy against gut-immune activation in a subpopulation of ASD subjects (e.g. with peripheral increase of gut-derived (α4β7) lymphocytes expressing IFN-γ and/or IL-17).

408.010 (Poster) Human Induced Pluripotent Stem Cell-Based Treatment in a Valproic Acid Rat Model of Autism

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Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that is characterized by deficits in social interaction and stereotypical patterns of behavior. Abnormal gamma wave patterns in the brains of ASD patients suggest that there is an imbalance in the ratio between excitatory and inhibitory signaling (E/I). Our lab was the first to characterize a significant loss of Parvalbumin expressing (PV+) GABAergic interneurons in the prefrontal cortex (PFC) of ASD patients, and later in our Valproic Acid (VPA) rat model of ASD (50% and 30% loss, respectively). Deficits in the PV+ cell population is believed to cause hyper-excitability in cortical circuits which contributes to promoting the core behavioral deficits observed in ASD patients and in our VPA rat model of ASD.

Objectives: We speculate that substituting this lost population of PV+ cells in VPA rats improves behavioral deficits by improving E/I signaling through the formation of functional inhibitory synapsis with the endogenous rat circuitry. To address this hypothesis, we proposed a Human Induced Pluripotent Stem Cell (hiPSC)-based therapy that ameliorates core behavioral deficits in VPA rats through the transplantation of Medical Ganglion Emience (MGE) cells (PV+ GABA precursor cells) into the medial PFC.

Methods: We first reprogrammed hiPSC’s into MGE cells using a previously defined 21-day dual SMAD inhibition protocol. We then bilaterally transplanted the human derived MGE cells into the mPFC of 6-week-old rats. We have four groups: VPA+MGE rats, VPA+dead MGE rats, VPA Rats and non-treated rats (n=9-12/group). In addition to performing patch clamp recordings of MGE cells, behavioral assays were assessed 1-month post-transplant using tests designed to model core behavioral deficits seen in human ASD (Social Apparatus Test, Marble Bury Test, Elevated Plus Maze Test, and Open Field Test).

Results: Our human MGE cell grafts were able to survive, extend fibers away from the injection site, and express PV marker 2 months post-transplant. In the social preference test, VPA animals with MGE cell transplants had significantly more transitions into the chamber with the novel animal relative to the VPA animals with dead MGE cell transplants (12.5 vs 7.0, P=0.01). In the open field test, VPA animals with MGE cell transplants traveled significantly more distance relative to the VPA animals with dead MGE cell transplants (128.56 vs 98.2 meters, P=0.046). Lastly, VPA animals with MGE cell transplants buried less marbles than those with dead MGE cell transplants, although to a non-significant extent (14.71 vs 6, P=0.08). Patch clamp recordings 4 weeks after transplant showed that MGE cell transplants had immature action potential properties.

Conclusions: Our preliminary findings suggest that our hiPSC-derived MGE cells were able to survive and mature after transplant. Moreover, our transplanted cells were able to rescue social, anxiety, motor and repetitive behavioral deficits in VPA rats. Lastly, the cell transplants immature electrical properties suggest that they may form functional inhibitory synapsis with the endogenous circuitry. Collectively, the use of hiPSC’s in the context of our study is promising novel approach with translational value for establishing the framework for a personalized hiPSC-based ASD human clinical trial.

408.011 (Poster) Lack or Reduction of the Autism Candidate Gene Reelin in Somatostatin Inhibitory Cortical Neurons Alters Developmental Trajectories in Mouse Pups: A Pilot Study

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Background: Autism Spectrum Disorder (ASD) is among the most heritable neuropsychiatric dysfunctions and increasing evidence indicates that abnormal development of cortical inhibitory circuits and the disruption of excitation and inhibition balance are central to ASD pathogenesis. While available evidence points to a complex set of genetic factors, Reelin (RELN) has emerged as a key candidate gene. Yet the exact relationship of how genetic mutations relate to circuit formation and behavioral alterations relevant to ASD remains largely unknown. Due to the multifaceted functions of Reelin in different cell types, it is still unknown which cell type is most affected and drives changes in circuits and behaviors relevant to ASD. The lack of a clear (endo)phenotype significantly hinders the development of specific-target therapies. Here, we aimed at bridging this gap by interrogating the function of a prominent ASD-associated gene, RELN, in a
Objectives: As a first step, we sought to evaluate isolation-induced ultrasonic vocalizations (USV) in mouse pups carrying a mutation in the ASD candidate gene Reln specifically in SST+ inhibitory cortical neurons. Pup USV serve important communicative functions and are known to induce maternal caregiving behavior.

Methods: N=32 mouse pups with a reduction or a lack of Reln (SST+/−;Reln+− and SST−/−;Reln−−, respectively) and wildtype littermate controls (SST−/−;Reln−−) of both sexes were individually isolated from mother and littermates and repeatedly exposed (postnatal days 3, 6, 9, and 12) to one of two experimental social conditions, i.e. clean versus home cage bedding, by an experimenter blind to the genotype. Broadband high-frequency ultrasound recordings were performed, followed by a detailed spectrographic analysis.

Results: Our preliminary results indicate a slight tendency for SST−/−;Reln+− and SST−/−;Reln−− pups to emit fewer isolation-induced USV compared to wildtype littermate controls, particularly in clean bedding conditions. Sex appeared to play a modulatory role. We further obtained evidence for effects on body weight gain, with mutant pups weighing less than wildtype littermate controls, highlighting differences in developmental trajectories.

Conclusions: This pilot study may suggest that a lack or a reduction of Reln in SST+ inhibitory cortical neurons affects socio-affective communication during early development. In future experiments, it would thus be interesting to assess the interaction between mother and pup in order to see whether alterations in pup ultrasonic calling leads to reduced maternal caregiving behavior, ultimately affecting pup developmental milestones.

408.012 (Poster) Life-Long Social Isolation Decreases Activation of Oxytocin Neurons in Zebrafish
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Background: Animal models of social isolation have been used as a tool to study various human neuropsychiatric disorders, including autism. Additionally, autistic individuals typically experience substantial social isolation, which may lead to more adverse effects on their brain development and social processing. Long-term behavioural and physiological effects of developmental social deprivation have already been well-established in rodents, songbirds, and primates, highlighting conserved physiological mechanisms that regulate social interaction in vertebrates. Social isolation in fish influences subsequent behaviour but less is known about how social networks in the zebrafish brain are affected by early social deprivation.

Objectives: Oxytocin is a neuropeptide involved in various social behaviours in vertebrates, including bonding, social interaction, and social anxiety. Zebrafish are a highly social vertebrate species that share 70-80% homology in molecular pathways and neural networks with humans, including the oxytocin system. Availability of sophisticated genetic manipulation in zebrafish further advances their utility as a model organism for studying neurodevelopmental disorders with strong heritability. As such, zebrafish has emerged as a promising model to study regulation of both typical and atypical behaviours relevant for better understanding of autism and other neuropsychological disorders. In particular, we investigated how social deprivation influences the function of oxytocin neurons in zebrafish.

Methods: Transgenic zebrafish, expressing fluorescent proteins in oxytocin-producing cells (oxtl:egfp), were either housed in isolation or in social groups, from larval stage to adulthood. Zebrafish from these two groups were either exposed to a brief social stimulation, non-social objects, or left undisturbed in their home tanks (n ≥ 8, for all groups; age-matched, mixed-sex). Subsequently, they were euthanized and the brains were prepared for immunohistochemical experiments using an antibody against phosphorylated S6 (pS6), an endogenous marker of neuronal activation. The number and size of eGFP-positive neurons and the intensity of the eGFP signal, here used as a proxy for oxytocin mRNA transcription, were analyzed by confocal microscopy (LSM770, Zeiss). The imaging analysis was performed using Fiji/ImageJ software.

Results: Compared to the socially-housed sibling control groups, zebrafish isolated throughout their lives had lower levels of activation in oxytocin neurons, as measured by pS6 immunoreactivity. There was no obvious effect of brief social or non-social stimulation on the number of activated oxytocin neurons in either isolated or socially housed animals.

Conclusions: Our results indicate that life-long social deprivation resulted in lower activation of the oxytocin neurons in adult zebrafish and that isolated zebrafish can be a valuable tool for studying the oxytocin system. Understanding oxytocin’s role will provide excellent insight into regulation of vertebrate socialization and into onset and aggravation of social abnormalities, seen in autism and other neuropsychiatric conditions.

408.013 (Poster) Multi-Compartmental & Prenatal Metabolic Exploration in a Rat Model of ASD
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Background: autism spectrum disorder (ASD) is a group of neurodevelopmental disorders whose etiology remains unknown. ASD is thought to begin in utero, but there is still a lack of information regarding the early biological modifications related to its pathophysiological mechanisms.

Objectives: our objective was to explore the biochemical changes occurring prenatally in the fetal brain and its environment using a validated animal model of ASD, i.e. a prenatal exposure to valproic acid (VPA).

Methods: metabolomics was used to investigate the biochemical modifications in the rat fetal brain, placenta, and maternal plasma extracted at the 19th day of gestation (GD19) from Wistar pregnant dams prenatally exposed to an acute VPA (600 mg/kg i.p.) or saline injection at GD12.5 (n=9 and 10 litters for the saline and VPA groups, respectively).

Results: we showed that the VPA acute injection at GD12.5 induced metabolic modifications observed in the fetal brain, placenta and maternal plasma at GD19. These changes were sex-specific in the fetal brains, the number of the discriminant metabolites being significantly more important in female than in male samples. In the fetal brain and placental compartments, VPA samples were discriminated from controls based on changes in energy, nucleotides, vitamin, inflammatory and amino acids-related (arginine, beta-alanine, GABA metabolisms in the fetal brains along with the methionine metabolisms in the placenta) metabolisms. In the maternal plasma samples, significant changes mainly involved amino acid metabolisms (beta-alanine, histidine, methionine metabolisms), and significant increases in pro-inflammatory cytokines (IL-6, TNF-α and IFN-γ) in the maternal plasma from the VPA group vs controls. In addition, these metabolic changes were highly and significantly correlated between each compartment.

Conclusions: These results support the crucial role of prenatal changes in the developing brain related to GABA neurotransmission, energy, nucleotides and inflammatory processes in the development of ASD-like phenotypes. It also emphasizes the role of the maternal environment, including a maternal inflammation in the pathophysiological mechanisms related to animal model of prenatal exposure to VPA. It also brings new insight into the biochemical modifications in the maternal environment that could be further investigated in the quest for early biomarkers of ASD.

408.014 (Poster) Preclinical Hearing-in-Noise Testing (HINT) Using Conspecific Ultrasonic Vocalizations (USVs) in the CNTNAP2 Mouse Model of ASD
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Background: Progress on treatments for communication difficulties in ASD has been hindered by lack of animal models with reliable assays of communication processing. Currently, model mice of ASD have been frequently studied, but the focus has been specifically on the output and repertoire of social vocalizations (Burkett et al. 2015). Moreover, the ability to identify relevant speech signals in one’s environment is clearly important for early social development, but also continues to play a critical role in learning and adaptive functioning across the lifespan. For example, a study of children with ASDs found that atypical scores on the Short Sensory Profile’s Auditory Filtering domain were significantly related to poor academic performance and inattention to cognitive tasks (Ashburner et al, 2008). Children and adolescents with ASD also exhibit significant difficulties hearing in background noise, or auditory filtering.

Objectives: We investigated auditory filtering capabilities using our hearing-in-noise test for the mouse, which makes use of the acoustic startle to assess the mouse’s ability to detect prepulse signals/targets presented in quiet or embedded in masking noise. Our prepulse signals/targets were either traditionally used noise bursts or novel conspecific ultrasonic vocalizations (USVs).

Methods: We modified established methods to test acoustic startle abilities behaviorally (Ison et al., 2017) to develop a hearing-in noise test for the mouse (mouse HINT). Our mouse HINT test made use of the acoustic startle response (ASR) and the ability of prepulses to inhibit the ASR [i.e., prepulse inhibition (PPI)] to assess the mouse’s ability to detect prepulse signals presented in quiet or embedded in masking noise. We determined signal-to-noise thresholds to both a noise burst (NB) and ultrasonic vocalization (USV) stimuli in quiet and in broadband noise. We assessed these differences to ten different conspecific mouse USVs separately or acoustically combined as “mouse babble” and tested in three mouse strains: C57Bl/6; FVB, 129SvEv, and C57Bl/6 x 129 SvEv. In addition, as mouse pups lacking the CNTNAP2 gene [CNTNAP2 (-/-)] emit less retrieval calls, and exhibit reduced repertoire of syllable vocalizations (Burkett, et al. 2015), we examined USV detection capabilities in mice lacking the CNTNAP2 gene and ASD mouse model.

Results: We determined there were mouse strain differences in USV discrimination abilities, yet for all strains tested the combination of 10 USVs (“mouse babble”) was the most effective startle stimulus in both quiet and background noise, and was more effective as a prepulse stimulus than a noise burst commonly used in ASR testing. Moreover, CNTNAP2 (-/-) mice exhibited less robust startle responses to mouse “babble” in both quiet and background noise.

Conclusions: We conclude conspecific USVs are a more robust and salient auditory target to study prepulse inhibition of acoustic startle than noise burst targets, and the CNTNAP2 (-/-) ASD mouse model not only has limited USV production, but also exhibits limited USV detection and discrimination capabilities. This type of analysis may provide a basis for future therapeutic test platform aimed at reducing auditory behavioral deficits.
Background: Aberrant connectivity between the medial prefrontal cortex (mPFC) and the mediodorsal thalamus (MD) is correlated with challenges in navigating social interactions. In mice, the mPFC Layer 5 pyramidal neurons that project to MD express the dopamine receptor D2 gene (Drd2). Previously, we showed that optogenetic excitation of Drd2+ cell bodies in mPFC was sufficient to reduce social exploration behavior in mice. Conversely, optogenetic inhibition of mPFC Drd2+ neurons was sufficient to rescue decreased social exploration behavior in the valproic acid autism model (Brumback et al. 2018). mPFC Drd2+ neurons are in the extratelencephalic class of neurons, and project to other subcortical regions besides MD. It is unclear if the projections to MD were specifically required for the effects on social behavior. Layer 6 cells also project to MD and it is unclear if similar manipulations of Layer 6 neurons would have similar effects on social behavior.

Objectives: The objectives of our study are to determine whether the reciprocal connections between MD and mPFC are necessary for social exploration and assess differences between Layers 5 and 6.

Methods: Male and female mice were injected bilaterally with an AAV encoding channelrhodopsin into mPFC or MD to assess whether directionality of information flow between the two brain regions is necessary for social behavior. In wildtype mice, Synapsin or CamKII promoters were used to target all projection neurons. In other mice, we expressed Cre-dependent channelrhodopsin under the Drd2-Cre (Layer 5) and Ntsr1-Cre (Layer 6). Light fibers were placed over the axons in the postsynaptic target region (MD or mPFC). Four weeks post-surgery, mice were run through 2 rounds of open field, novel social exploration, novel object exploration, and olfaction habituation/dishabituation tests to assess the effects of light stimulation on behavior. Mice were randomly assigned light on or off during week 1 of behavior and given the opposite light condition the following week.

Results: Overall, excitation of pan-neuronal or layer-specific fibers projecting to MD had no effect on total distance moved or time spent in the center of an open field. Excitation of Layer 5 Drd2-expressing neurons decreased time spent sniffing a social but not nonsocial stimulus whereas excitation of layer 6 Ntsr1-expressing neurons increased time spent sniffing both social and nonsocial stimuli. Conversely, excitation of pan-neuronal mPFC fibers in MD resulted in no changes to any behaviors measured. Excitation of projections from MD to mPFC was sufficient to decrease social sniffing time without affecting object sniffing time.

Conclusions: These experiments begin to uncover part of the complex mechanisms involved in regulating social behavior. Our results corroborate previous findings showing that subcortically-projecting mPFC neurons are necessary for social exploration in mice. We provide novel findings that these effects involve MD and are layer specific. We further show that MD neurons projecting to mPFC are also necessary indicating a bi-directional exchange of socially relevant information. Further studies will examine how neuromodulation of these specific cell populations influence prefrontal-dependent behaviors in mouse models of neuropsychiatric conditions.

Objectives: Our aim is to examine ultrasonic vocalizations (USVs) emitted by the model pups upon maternal isolation and clarify acoustic alterations of USVs comparing with those emitted by the wild-type pups.

Methods: The numbers of animals were 12 model pups (six male and six female) and 21 wild-type pups C57BL6/J (11 male and 10 female). Each pup was repeatedly isolated from the dam and littersates on postnatal days (PNDs) 4, 7, 10, 13, 16, and 19, and USVs emitted by the pup were recorded for 5 min and analyzed by using the Sonotrack System and Call Classification Software for Mice (Metris, The Netherland). The genotyping was executed on PND 28. Therefore, the experimenters did not know which pups were model or wild-type pups.

Results: The model pups exhibited extraordinary elevations of USVs compared with the wild-type pups on PNDs 10 (p < 0.001), 13 (p < 0.001), and 16 (p < 0.05), Fig. 1. On these experimental days, the model pups increased USV percentages with longer durations (15–100ms), whereas the wild-type pups increased those with shorter durations (4–15ms). An USV with frequency-changes more than 2 kHz was defined as frequency-modulation. The model pups increased percentages of frequency-modulated USVs of up, down, and other
complex changes but the wild-type pups increased percentages of frequency-constant USVs with frequency-change less than 2 kHz. When an USV consists of several segments, each segment was counted as a syllable. The model pups increased USV percentages with 2–3 syllables, whereas the wild-type pups produced one syllable-USVs. The Call Classification Software classified USVs into 14 categories based on syllable, duration, and frequency-modulation. The model pups indicated higher percentages of USVs categorized into Down and Step-Up types, whereas the wild-type pups indicated higher percentages of USVs categorized into Short type.

Conclusions: Maternal isolation induces higher anxiety in pups because pups are unable to survive without maternal care. Accordingly, pups emitted USVs to call their dams. In this study, the model pups produced more USVs with longer durations, frequency-changes, and multi-syllables. These acoustic characteristics are more attractive and noticeable for dams than USVs with shorter durations, frequency-constant, and one syllable. Maternal isolation seems to cause much higher anxiety for the model pups. Tamada et al. (2010) determined brain serotonin in the model pups on 1–3 weeks after birth and reported the reductions of serotonin levels. This suggests latent anxiety disorder in the model pups. Altogether, we conclude that the model pups emitted altered USVs due to much hyper anxiety.

408.017 (Poster) Uncovering Genotype-Phenotype Relationships across the Tbr1 Allelic Spectrum
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Background: The transcription factor gene TBR1 is strongly associated with a neurodevelopmental condition involving intellectual disability and autism. Patient mutations in TBR1 differ broadly in their type (e.g., frameshift, missense) and exonic location, potentially causing loss-of-function, gain-of-function, or dominant-negative effects. We previously characterized mice carrying different Tbr1 alleles: 5’ frameshift patient mutation p.A136Pfs*80 (p.A136fs), T-box missense patient mutation p.K228E, or knock-out by replacement of exons 2–3 with a neomycin cassette (“neo-KO”). Both neo-KO and p.A136fs resulted in loss of TBR1 protein, while p.K228E caused upregulation of a highly stable but dysfunctional TBR1 mutant protein. All three alleles produced congruent axon defects but discordant cortical cellular defects, including severe apoptosis unique to neo-KO. It is not fully understood how these Tbr1 alleles impact gene expression programs to produce phenotypic similarities and dissimilarities. Furthermore, the functional effects of other TBR1 patient mutations, such as 3’ frameshifts, have yet to be defined.

Objectives: We aim to identify the core molecular effects and brain developmental phenotypes resulting from different patient-specific TBR1 mutations. We also aim to identify distinct effects of each mutation that could underlie the heterogeneity of symptoms in TBR1-related conditions.

Methods: We analyzed Tbr1 mutant mouse lines p.A136fs, p.K228E, neo-KO, and an additional KO allele with exon 2–3 deletion using germline Cre-loxP (“del-KO”). Heterozygotes (reflecting human TBR1 heterozygosity) and homozygotes were compared to wild-type (WT) littermates, and both sexes were included. Postnatal cortex was analyzed using Western blot, quantitative PCR, and immunohistochemistry (IHC). RNA-seq was conducted in embryonic cortex to identify differentially expressed genes (DEGs) in Tbr1 mutants. TBR1 3’ frameshift patient mutation p.T532Rfs*144 (p.T532fs) was analyzed using in vitro assays in transfected HEK-293T cells.

Results: In Tbr1 neo-KO, p.A136fs, and p.K228E homozygote embryonic cortex, we identified a core set of ~600 genes dysregulated in all three lines. These genes include known TBR1 targets (Reln, Wnt7b, and Rorβ) as well as extracellular matrix (ECM) and cytoskeletal genes. In heterozygotes, fewer DEGs were identified; DEGs shared by at least two of three Tbr1 lines play roles in ECM (Cxcl12, Col23a1, Hs3st3b1), metalloprotease activity (Adams3, Tll2), and cytoskeleton (Nefl). The neo-KO allele produced more overall DEGs than p.A136fs or p.K228E, and DEGs unique to neo-KO were enriched for mitotic cell cycle functions, potentially underlying their severe apoptosis. Unlike neo-KO, del-KO mutants did not show severe apoptosis by IHC, suggesting detrimental effects of the neomycin cassette on cell survival. Finally, our preliminary in vitro analysis of p.T532fs protein found enhanced stability in the cycloheximide assay, and p.T532fs also enhances stability of WT TBR1 co-expressed in the same cells.

Conclusions: Analyses of multiple Tbr1 alleles suggest a common emerging etiology of dysregulated ECM and cytoskeletal genes during cortical development, potentially underlying the congruent axon defects in Tbr1 mutant brains. Moreover, 3’ frameshift mutations may enhance TBR1 stability similar to T-box missense mutants, suggesting a common pathogenic mechanism for mutant TBR1 proteins. Ongoing studies of patient-specific TBR1 mutations will further decode mechanisms controlling brain development and enhance our understanding of autism etiology.
Panel Chair: Caitlin Clements, Labs of Cognitive Neuroscience, Boston Children's Hospital
Labs of Cognitive Neuroscience, Brookline, MA

Discussant: April Levin, Neurology, Boston Children's Hospital, Brookline, MA

Resting state EEG offers a powerful, low-cost method to assess neural activity in young children. Features of the resting state power spectrum have been associated with cognition and development, and group level differences in oscillatory measures have been noted for those with ASD or elevated likelihood of ASD. This panel further describes behavioral correlates of resting state EEG in children, particularly investigating associations with sleep problems, restricted and repetitive behaviors, sensory processing challenges, and nonverbal and verbal developmental level. The panel also presents a diversity of features that can be extracted from the EEG power spectrum, and multiple methods of doing so, including periodic (oscillations) and aperiodic (exponent) signals extracted via FOOOF (Fitting Oscillations and One Over F), and transient beta activity computed via the Spectral Events Toolbox. Panelists and discussant will provide background and context for interpreting resting state EEG, and describe strengths and limitations of different features of EEG for gaining insight into behaviors and for use as potential biomarkers in clinical trials.

204.001 (Panel Discussion) Resting State Transient Beta Activity in Young Children with ASD
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Background: While resting electroencephalography (EEG) offers substantial promise in developing biomarkers for autism spectrum disorder (ASD), understanding the neurophysiological mechanisms that underlie patterns of human EEG activity remains a challenge. Measurements of transient beta events (TBE) offer an exception to this challenge. These events are brief (lasting ~150 ms), recurrent, and reproducible patterns of EEG activity in the 15-29 Hz band. TBEs are driven by precisely timed thalamocortical circuit activity that has been well characterized in animal and computational models. TBEs also modulate sensory processing, leading to suppression or facilitation of sensory stimuli depending on the exact timing at which sensory events occur; this is particularly relevant given the paradoxical mix of hyper- and hyposensitivity that can be seen in ASD.

Objectives: We examined transient beta activity over the somatosensory cortex at rest in young children with ASD compared to those with typical development (TD). In a subset of subjects, we evaluated the relationship between TBE and phenotypic measures of sensory processing.

Methods: We collected data from children aged 3-4 years with ASD (n=22) and TD controls (n=24), matched across groups for age and gender. Continuous multichannel EEG was recorded while participants watched a silent video. TBEs located over the somatosensory cortex (C3, C4) were analyzed using the Spectral Events Toolbox in MATLAB. The mean and standard deviation of TBE features were computed for each individual across multiple 5000-ms epochs (average of 35 epochs per individual), and these were compared across groups using a Mann-Whitney U test. The Sensory Profile 2 (SP2) was completed by caregivers for a subset of participants (nASD=16, nTD=15), and associations between TBE rate and SP2 measures were examined with Spearman correlations. p<0.05 was considered statistically significant.

Results: TBE rate, power, and frequency span were all significantly higher in ASD, relative to TD (p=0.04, d=0.44; p=0.03, d=0.24; p=0.001, d=0.51, respectively). Intra-individual variability in TBE rate (as measured by the standard deviation of TBE rate across trials within an individual) was higher in individuals with ASD, relative to TD (p=0.03, d=0.61). TBE rate was significantly positively correlated with multiple SP2 measures, including tactile hyperactivity (r=0.50, p=0.004; see Figure 1).

Conclusions: Our data suggest TBEs occur more frequently and with greater power at rest in individuals with ASD compared to those with typical development (TD). In preschool children, the rate of TBE occurrence is more variable across epochs in ASD. Moreover, TBE rate is positively correlated with multiple measures of sensory processing. These differences provide insight into the mechanisms of sensory processing and allow us to generate new theories. For instance, given the role of TBE timing on sensory facilitation or inhibition, the greater variability of TBE occurrence in ASD could explain how ASD can give rise to both hyper- and hypo-sensitivity in the same individuals. Further data will be collected as part of this study to increase sample sizes and continue to study these features and associations.

204.002 (Panel Discussion) Evaluating EEG Based Biomarkers of Restricted and Repetitive Behaviors for Toddlers with or without ASD
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Background:
Restricted and repetitive behaviors (RRBs) are one of the primary characteristics of the autism spectrum disorder (ASD). In typical development, repetitive motor behaviors appear early, declining after the first year of life. Across the autism spectrum, a greater severity of all RRBs, even simple repetitive motor behaviors are seen across early childhood (Kim et al., 2010).

Limited knowledge is available concerning the neurophysiological substrates associated with RRBs. Studying E/I balance could be particularly relevant to manifestation of RRBs as the imbalance of excitation and inhibition is suggested to be associated with social/cognitive deficits in autism (Rubenstein & Merzenich, 2003; Markram & Markram, 2010). Within EEG, the aperiodic exponent has been linked to the E/I balance (Gao et al., 2017). However, it has not yet been studied whether abnormalities found in E/I balance, measured via the aperiodic exponent, may account for severity of RRBs particularly manifested in ASD in early childhood.

Objectives:

We aimed to investigate the relation between severity of RRBs and the aperiodic exponent across 4 groups of infants (1) no concerns at 12 months (Low Likelihood-LL), (2) infants with an older autistic sibling (sibling-no ASD), (3) lower 12-month screening scores (screening-no ASD) on the (CSBS), (4) infants with an ASD outcome (ASD).

Methods:

At 12 months, aperiodic exponents were calculated via FOOOF (Donoghue et al., 2020) from a 5 minute resting-state EEG data. Exponents were extracted for frontal, central, temporal, posterior, and whole regions. At 24 months, RRBs were assessed via the Repetitive Behavior Scale-Revised parent report questionnaire. Associations between exponents and RRB were assessed using pearson correlation and linear regression with age and sex as covariates.

Results:

First, ASD group showed higher RRB scores than LL, sibling-noASD, and screening-noASD at 24 months [F(1,3) = 18.3, P < 0.001]. Next, we did not find evidence of a group level difference in exponents at 12 months [F(1,3) = 1.6, P= 0.19] (See Table 1). Finally, we asked whether the aperiodic exponent predicted severity of RRBs. Interestingly, we found a main effect of posterior exponents ( = -57.26, SE = 14.87, t = -3.85, p < 0.001) and an interaction between posterior exponents and groups in predicting RRBs [F(1,3) = 4.53, P = 0.004], with the interaction resulting from the ASD group (r = -.51, p=0.025). More specifically, there was a negative relation between the exponent and RRB, such that lower exponent, indexing higher E/I imbalance was associated with more RRBs. This relation was particularly prominent in ASD (Figure 1). A similar significant relation was observed with the model with central exponent as the predictor, and weaker trends were found with frontal, temporal, and whole exponent (model not significant).

Conclusions:

The finding that lower aperiodic exponent was associated with more RRBs in ASD highlights the importance of investigating E/I imbalance and its implications in ASD. We further plan to explore the relation between periodic oscillatory dynamics and RRB to fully understand neurophysiological mechanisms underlying behavioral manifestations in ASD.

204.003 (Panel Discussion) Considering the “Rest” in Resting State: Alpha Rhythm Associations with Sleep in Individuals with Disruptive Genetic Variants

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Background: Sleep problems are prevalent in autism, including those related to difficulties with bedtime routine and nighttime awakenings (Liu, Hubbard, Fabes, & Adam, 2006) with 65% of parents report at least one problem in children aged 4-10 years (Sounders et al., 2009). Considering the biological foundation of sleep, it is important to consider a genetics-first approach to disentangle the potential mechanisms involving multidimensional measures of sleep and autism. Recent evidence indicates potentially unique sleep problems for young individuals with disruptive genetic variants associated with autism, such as CHD8 and DYRK1A (Earl et al., 2021). From a neurobiological perspective, it is thought that alpha rhythms (oscillations within the 8-12 Hz range) help suppress external responses to stimuli (Toscani et al., 2010; Haegens et al., 2011). Thus, reduced alpha rhythm may be related to increased sleep problems (e.g., bedtime issues, nighttime awakenings, or overall low quality).
Objectives: Here, we test the relationship between alpha rhythm (8-12 Hz) and sleep in autistic individuals with and without disruptive genetic variants associated with autism.

Methods: We utilize data from several studies that have both resting state and sleep data (N=111), including two studies that ascertained participants based upon a known genetic variant (n=39, TIGER study; n=41, BIOGENE study) and one study that ascertained based upon autism diagnosis (n=31, ZEBRA study). Resting state paradigms were comparable across studies, wherein children watched screensaver-like videos that were presented for 2-5 minutes; only eyes-open conditions are used here. Group differences in EEG frequency bands were compared using repeated-measures linear mixed effects models with Bonferroni-correction. Sleep problems were reported by parents during a clinician-administered medical history questionnaire (adapted from the Simons Simplex Collection Medical History Questionnaire) and included questions related to sleep onset, breathing issues, nighttime awakenings, and daytime tiredness. An additional subset of parents completed the Pittsburgh Sleep Quality Index (Buysse et al., 1989). Separate linear mixed effects analyses tested how binary sleep factors and sleep quality predicted peak frontal alpha power (identified from 8-12 Hz).

Results: Preliminary results include the TIGER and ZEBRA subset of participants with processed EEG data: 39 with a genetic etiology and 31 with idiopathic autism. Alpha was not associated with group differences, F(1,66)=0.014, p=.91. Alpha values were increased by 0.4 when parents endorsed problems with nighttime awakenings, p=.049. Lastly, there was a interaction between group and sleep quality, F(1,66)=6.37, p=.014, such that poor sleep quality (increased PSQI score) was related to an increased alpha power by for the genetic subgroup (0.47 slope) but not the idiopathic subgroup (0.67 slope, non-significant).

Conclusions: These results suggest that lower alpha rhythm is related to better sleep quality in genetic but not the idiopathic subgroup. Further work to understand individual difference factors, such as sex, age, cognition, and autistic symptoms, and subgrouping by specific genetic variant will be helpful in clarifying this finding.

204.004 (Panel Discussion) Characterizing the Resting State in Toddlers with Tuberous Sclerosis Complex
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Background: Tuberous Sclerosis Complex (TSC), a condition in which TSC1 or TSC2 mutations lead to benign hamartomas impacting neuronal function and connectivity, manifests behaviorally with features of autism, epilepsy, and intellectual disability. Approximately 50% of individuals with TSC meet criteria for Autism Spectrum Disorder (ASD). The neural mechanisms underlying ASD in individuals with TSC remain unknown, despite the known underlying gene mutation and resulting disruptions in neuronal pathways (the mammalian target of rapamycin (mTOR) pathway). Electroencephalography, or EEG, offers a window into neural oscillatory activity and may serve as an intermediate biomarker between gene expression and behavioral manifestations of ASD. Features of resting state EEG in infants with TSC have been associated with developmental outcomes. Dickinson et al (2019) reported that reduced interhemispheric alpha phase coherence in infants that were later diagnosed with ASD, and De Ridder et al (2020) found that an abnormal first EEG in infancy - or specifically, an immature EEG background - was associated with later ASD features, and lower language, cognitive, and motor scores at 24 months. Characterizing resting state EEG at baseline, before intervention, may predict treatment response for children with a known genetic etiology of autism.

Objectives: To characterize resting state EEG power in toddlers with Tuberous Sclerosis Complex and explore associations with developmental level.

Methods: Individuals with TSC (n=59) between 12 and 38 months (mean: 22.7, SD: 7.9; Table) were recruited for a behavioral intervention study. Before intervention, resting state EEG was collected using a 128-channel high density geodesic EGI cap. Children also completed the Mullen Scales of Early Learning (MSEL; Mullen, 1995). EEG data were processed using BEAPP (Levin et al., 2018), and power spectral densities were calculated using a multitaper spectral analysis then decomposed using FOOOF (Fitting Oscillations and One Over the F, Donoghue et al., 2020) into periodic and aperiodic components. Associations between aperiodic components (slope, offset) and verbal (MSEL receptive and expressive language) and nonverbal (MSEL visual reception and fine motor) scores were assessed with linear regression, controlling for chronological age.

Results: EEG data from 42 participants were included after data cleaning, yielding 71% data retention. Preliminary results showed no significant association between aperiodic slope or offset and participant age, though when binned by age, visual inspection indicated a consistent pattern of small increases in offset with age (Figure). Neither aperiodic slope nor offset predicted Mullen verbal or nonverbal composite (p>0.05).
Conclusions: Toddlers with TSC did not show a significant relationship of aperiodic slope or offset with chronological age or developmental level. More descriptively the data visually mirrored a large sample of typically developing toddlers (Wilkinson et al, in prep). Resting state EEG in TSC prior to intervention may eventually predict response to treatment and ultimately serve as biomarkers to inform personalized intervention selection. Future work will examine periodic components and additional covariates.

POSTER SESSION — BRAIN FUNCTION (fMRI, fcMRI, MRS, EEG, ERP, MEG)

409 - Brain Function (fMRI, fcMRI, MRS, EEG, ERP, MEG)

409.018  (Poster) A Survey of Epileptiform Discharges in Children with Autism Spectrum Disorders and a Pilot Study of Outcomes with Exposure to Anti-Epileptic Medication

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Background:

Children with Autism Spectrum Disorder (ASD) have increased prevalence of epilepsy and/or abnormalities in EEG associated with behavioral issues (Anand & Jauhari, 2019; Giannotti et al., 2008; Hartley-McAndrew & Weinstock, 2010). The role of anti-epileptic drugs (AEDs) in such cases remains uncertain. Preliminary studies from our ongoing studies using EEG to understand autism and its cognitive and behavioral comorbidities, have suggested that prolonged EEG (up to 3 hours) recordings, including awake and sleep states, increase identification of significant epileptiform abnormalities in ASD.

Objectives:

To measure the prevalence and frequency of interictal epileptiform discharges (IEDs) in children with ASD with or without history of epilepsy in both awake and sleep states.

Explore short term clinical response to AEDs in those with IEDs.

Methods:

133 children with ASD aged 2-17 years underwent prolonged video-EEG recording for up to 3 hours using a 64-channel Philips Geodesic EGI 400 system using a specially designed protocol without use of sedatives. Children predominantly had moderate to severe ASD. The clinical contexts included regression, severe hyperactivity, self-injurious behaviors and/or aggression, with minimal response to first line psychotropics. EEGs were reviewed by the neurologist focusing on channels corresponding to the standard 10-20 system, to assess for IEDs and estimate their frequency in awake and sleep states. For 12 children with abnormal EEG, AEDs were started after educating parents regarding the empirical nature of this intervention for behavioral challenges. A pre and post treatment (2 months) assessment was done using Autism Treatment Evaluation Checklist (ATEC). Wilcoxon Sign Ranks Test was done to compare pre and post treatment scores.

Results:

Of the 133 children, 20 (15%) had IEDs in their awake-records. This yield increased to 47 children (35.3%) with extended record including a sleep phase covering Stage 1 and Stage 2 sleep. Of the 47 children with abnormal EEGs, 14 had previous history of clinical seizures and 2 had family history of seizures. Frequency of IEDs increased from ‘rare’ to ‘very frequent’/ ‘continuous spikes’ in sleep. 12 children who were exposed to AEDs were followed up after 2 months. Use of AEDs showed significant behavioral improvement clinically. There was significant improvement on the Autism Treatment Evaluation Checklist Scores in the domains of speech and language communication (p<0.005), sensory cognitive awareness (p<0.005) and health/physical behaviors (p<0.006). There were significant differences in the total scores as well (p<0.003). None of these children had additional interventions compared to baseline.

Conclusions:

Prolonged EEG recording increases the yield of IEDs in children with ASD. Sleep recording demonstrated enormous spike burden in some. High spike burden in sleep could arguably contribute to the behavioral problems in children with ASD. This reasoning led to use of AEDs with observed behavioral improvement. We acknowledge concerns about use of AEDs in those children without clinical diagnosis of
epilepsy and the uncertainties around the concept of ‘silent seizures’. We provide pilot evidence to show that AEDs may be beneficial in severe forms of ASD. Well-controlled interventional studies with larger samples, to explore cognitive and behavioral outcomes are necessary.

409.019 (Poster) Aberrant Resting-State Functional Connectivity in Individuals with ASD and ADHD Comorbidity

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Background: Autism Spectrum Disorder (ASD) and Attention-Deficit/Hyperactivity Disorder (ADHD) are conventionally thought to be very distinct neurodevelopmental disorders, but researchers have found that 30%~50% of individuals diagnosed with ASD also exhibit symptoms of ADHD. Extensive research has examined the neurobiological basis of ASD and ADHD separately, and the current literature suggests that both ASD and ADHD are characterized with aberrant brain connectivity within the default-mode, central executive, and salience networks (DMN, CEN, and SN). However, little is known about the neurobiological profiles of the comorbid group in comparison to the ASD-only group.

Objectives: The current study aimed to understand the neurobiological differences of individuals with both ADHD and ASD compared to those with only ASD. Specifically, we would like to examine the resting-state functional connectivity amongst the DMN, CEN, and SN along with the hippocampal memory network between ADHD-ASD comorbid and ASD-only groups.

Methods: Using available data from open-access datasets ABIDE (The Autism Brain Imaging Data Exchange) I from two sites (NYU and KKI) with information about comorbid conditions, we identified 23 individuals with comorbidity of ASD and ADHD and found 23 individuals with only ASD. The two groups were well-matched on gender, age, full-scale IQ and the distribution across two sites. All individuals completed a resting-state fMRI scan and their movements were within normal range during the scan. Based on the literature, we chose the following coordinates for DMN (ventromedial PFC/vlPFC: -2,38,-12; posterior cingulate cortex/PCC: -6,-44,34), CEN (bilateral dorsolateral PFC/dIPFC: -/+4,6,20,44; bilateral posterior parietal cortex/PCC: -40,-56,44 and 52,-52,50), SN (bilateral fronto-insular cortex/FIC: -34,20,-8 and 39,23,-4 and anterior cingulate cortex/ACC: 6,24,32), and bilateral hippocampus (-/+24,-14,-20) ROIs, to examine the functional connectivity differences between the ASD+ADHD and ASD-only groups. Standardized preprocessing pipelines were used for temporal alignment, normalization, smoothing and motion correction. Pearson's correlation was used to create t maps for each ROI, and significant results were thresholded at p<0.01 with 128 voxel-size (p<0.01 FDR-corrected) for each examined.

Results: We found that the ASD+ADHD comorbid group showed no increased connectivity compared to the ASD-only group but did show decreased connectivity compared to the ASD-only group amongst left dIPFC with superior temporal sulcus/gyrus, right AIC with vlPFC, left hippocampus with putamen and thalamus, as well as PCC with right insula and ACC. However, there were no significant group differences on the ASD symptom measures (from ADI-R and SRS) between the ASD+ADHD and ASD-only groups.

Conclusions: Our findings suggest that the individuals with comorbid ASD+ADHD were characterized with decreased functional resting-state connectivity compared to their ASD-only peers across the DMN, CEN, SN and hippocampal memory networks. Most of the aberrant connectivity observed in the comorbid ASD+ADHD group was associated with the CEN (e.g., dIPFC and vlPFC) and SN (i.e., FIC and insula) which are in general related to attention and state-monitoring abilities, in alignment with their attention deficits in addition to their ASD symptoms. The weaker hippocampal-putamen connections also seem to suggest a special deficit in the interaction of the memory, learning, and motor control systems in the comorbid group.

409.020 (Poster) Abnormal Properties of Resting EEG in Girls with Rett Syndrome

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Background: Rett Syndrome (RTT) is a rare neurodevelopmental disorder, caused by mutation in MECP2 gene, and associated with autism spectrum disorder. Its behavioral phenotype is quite severe as most patients with RTT (usually girls) could not talk or work independently, have problems with voluntary actions and communication. At the same time no drastic changes in brain structure or function are found. Recently emerging indexes, obtained from electrical brain activity (EEG), such as long-range temporal correlation (LRTC), believed to reflect the ability of brain networks to integrate information over extended periods, might provide important insight into the pathophysiology of RTT. Previous studies showed several abnormalities in spontaneous EEG in Rett Syndrome (for review see, Smirnov et al., 2022), while none examined the long-range temporal correlation.

Objectives: Here we aim to identify EEG parameters that are linked to pathophysiology of RTT.
Objectives: To investigate how age influences functional connectivity during visuospatial reasoning in autistic versus typical children.

Methods: 23 autistic (AUT) and 23 typical (TYP) children matched on age (6-15y), Raven’s Progressive Matrices and laterality completed a computerized fluid reasoning task in a 3T MRI scanner. The task contained 84 visuospatial problems with three levels of complexity. After preprocessing, generalized psychophysiological interaction (gPPI) and age regression analyses were performed (cluster threshold p<.05, FDR corrected, voxel threshold p<.001 uncorrected). The most activated clusters during the reasoning task were selected as seeds (precentral gyri, inferior frontal) and other frontal areas, the insula and the cingulate gyrus. In adolescents, no significant between-group differences were observed for either occipital or frontal seeds (precentral gyri, inferior frontal) and other frontal areas, the insula and the cingulate gyrus. In adolescents, no significant between-group differences were observed for either occipital or frontal seeds.

Results: In AUT participants, there was no significant relationship between age and functional connectivity involving the selected seeds and the rest of the brain. On the other hand, results from TYP participants showed positive associations between age and functional connectivity involving occipital seeds and many regions in frontal and parietal lobes, as well as between frontal seeds and many regions in frontal, parietal, temporal, and occipital lobes. This suggests rather different developmental effects in reasoning-related functional connectivity in AUT versus TYP individuals. Then, group comparisons (AUT vs. TYP) were performed within the younger (6-11y) and older (12-15y) age subgroups. Analyses in younger subgroups revealed higher functional connectivity related to complex visuospatial reasoning in AUT relative to TYP group between occipital seeds (secondary visual areas) and frontal regions, as well as between frontal seeds (precenral gyri, inferior frontal) and other frontal areas, the insula and the cingulate gyrus. In adolescents, no significant between-group differences were observed for either occipital or frontal seeds.

Conclusions: There was no significant developmental increases in functional connectivity within fluid reasoning network in autistic participants, whereas significant age-related increases in functional connectivity were observed in typical participants from 6 to 15 years old. These results nuance existing connectivity models in autism by highlighting the importance of considering developmental trajectories in brain connectivity. Consistent with the developmental shift model (Uddin et al., 2013), distinct patterns were observed in childhood and adolescence, namely the presence of over-connectivity in young AUT compared to young TYP, and no difference between AUT and TYP adolescents. In short, these results support 1) the importance of considering the age variable in autism neuroimaging studies, and 2) the presence of a developmental shift in connectivity within the fluid reasoning network in autism, going from widespread over-connectivity in childhood to fronto-parietal under-connectivity in adulthood.
409.022 (Poster) Age-Related Activity Increase in Visual Brain Regions Is Specific to Complex Visuospatial Fluid Reasoning in Autistic Children

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Background: In autistic adults, fluid reasoning is supported by occipital hyperactivity and prefrontal hypoactivity, suggesting a greater influence of visuoperceptual resources in reasoning (Soulieres et al., 2009; Sahyoun et al., 2010). While behavioral studies point towards better visuospatial fluid reasoning skills in autistic compared to typically developing (TD) children (Sahyoun et al., 2009; Danis et al., 2022), whether the cerebral activity pattern observed in adults is already present in school-aged autistic children remains unknown.

Objectives: To compare cerebral activity underlying fluid reasoning in autistic versus TD children, focussing on problem content, complexity and age.

Methods: 22 (1 female) autistic and 24 (5 females) TD children (6-15 years old; M=11.47, SD=2.39), matched on age, gender, handedness and Raven’s Progressive Matrices, completed 168 pictorial 2x2 matrix problems randomly presented in an event-related fMRI design. Problems varied in content (Visuospatial or Semantic) and relational complexity (0, 1 or 2 relations to manipulate mentally). Data were collected with a Siemens 3T MRI scanner and preprocessed and analyzed with SPM12 (k=20 voxels, FDR corrected cluster-level p<.05).

Results: Autistic and TD participants reached similar levels of accuracy (p=.14) and RT (p=.44), with better performance at Semantic>Visuospatial problems and at 0>1>2 relations problems. Overall, fluid reasoning was supported by a large occipito-parieto-temporal network, with increased activity in bilateral parietal lobules for the most complex problems (2 relations). In the autistic group only, better performance at the task also predicted increased activity in the left middle and superior frontal gyri. Interestingly, activity in several posterior regions (lingual and calcarine gyri, cuneus) was stronger in TD than autistic children during both semantic and visuospatial problems. Older (12-15 years old) participants showed stronger frontoparietal activity compared to younger (6-11 years old) participants at 1 and 2 relations problems. In the TD group, older participants exhibited stronger temporal, parietal and occipital activity than younger participants for complex problems. In the autistic group, weaker frontal and occipital activity was found in older versus younger participants for complex semantic problems. However, increased activity in middle frontal and precentral gyri, but also fusiform, inferior temporal, precuneus, parietal lobules and middle occipital gyri was found in older autistic participants for complex visuospatial problems.

Conclusions: Fluid reasoning elicited a comparable widespread cerebral network in autistic and TD school-aged children and adolescents. Within this network, activity in several posterior regions was stronger in TD compared to autistic children, contrary to previous findings of increased occipital activity in autistic adults relative to TD adults. Fluid reasoning development was characterized by an increase in frontoparietal activity in all participants. There was also an age-related increase in occipital activity for complex problems in TD participants, whereas the age-related increase in occipital activity was specific to complex visuospatial reasoning in autistic participants. This suggests a developmental effect in the specialization of visuoperceptual regions in autism, leading to a greater reliance on visuoperceptual processes during fluid reasoning in adulthood.

409.023 (Poster) Altered Fusiform Connectivity Underlying Face Processing Deficits in Youth with Autism Spectrum Disorder Compared to Early-Onset Psychosis

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Background: Autism spectrum disorder (ASD) and early onset psychosis (EOP) are neuropsychiatric disorders characterized by social deficits, including impaired processing of facial expressions (Brennan et al., 2014; Dalton et al., 2005; Marwick and Hall, 2008; Narita et al., 2021). The fusiform gyrus has been implicated in face/emotion processing impairments cross-sectionally in both groups (Apicella et al., 2013; Kleinians et al., 2009; Schultz, 2005). Few studies have investigated the association between fusiform gyrus connectivity and emotion processing in ASD youth relative to EOP youth to identify any shared or distinct patterns unique to each diagnostic group.

Objectives:

To examine whole-brain functional connectivity of the fusiform gyrus and its relationship to emotion processing measures in a group of youth with ASD or EOP, compared to typically developing (TD) controls.

Methods:
Resting-state MRI data were acquired on a 3T Siemens scanner for 24 adolescents with ASD (Mean age = 15.89), 25 EOP adolescents (Mean age = 16.42), and 21 TD controls (Mean age = 17.26). Data were preprocessed in FSL (Smith, 2004) and AFNI (Cox, 1996), and included motion correction, nuisance regression (white matter, cerebrospinal fluid), and bandpass filtering (0.008 < f < 0.08 Hz). A 6mm right fusiform gyrus (rFG) seed (Koshino et al., 2008) was used to extract timeseries and correlate with whole-brain signal. Final connectivity maps were normalized using Fisher’s r-to-z transformation. Parameter estimates were extracted from significant clusters of rFG connectivity within each group. Pearson’s correlations were run to examine the relationship between rFG connectivity and the WebCNP Emotion Recognition Test accuracy and speed of processing scores (KER-40; Gur et al., 2010).

Results:

Between-group comparisons revealed both ASD and EOP youth demonstrated mixed over-and-under-connectivity of the rFG compared to TD controls. Specifically, ASD demonstrated rFG overconnectivity with right superior parietal lobule; but underconnectivity with left inferior occipital gyrus and right superior temporal gyrus compared to TD controls (p = .01). In contrast, EOP demonstrated rFG overconnectivity with right inferior parietal lobule, right supramarginal gyrus, and right middle temporal gyrus; but rFG underconnectivity with right inferior occipital gyrus compared to controls (p = .01). Only rFG overconnectivity was associated with poorer performance on KER-40 task in both ASD (p = .04) and EOP (p = .04) groups, and additionally with faster speed of processing (p = .05) in the EOP group.

Conclusions:

Our results suggest distinct patterns of mixed rFG connectivity in both ASD and EOP, of which the overconnectivity patterns were most associated with difficulty in recognizing facial emotions. Specifically, ASD group demonstrated rFG overconnectivity with regions implicated in social cognition (Bigler et al., 2007) and visuospatial processing (DeRamus et al., 2014). EOP youth demonstrated rFG connectivity patterns in regions associated with processing of emotional responses (Numssen et al., 2021; Wada et al., 2021). These findings suggest that atypical connectivity of the rFG may be exhibited by both ASD and EOP, contributing to emotional processing deficits in each via different pathways, such as broader social and visual difficulties in ASD and more specifically disrupted emotional response processing in EOP.

409.024 (Poster) Altered Global Modular Organization of Intrinsic Functional Connectivity in Autism Arises from Atypical Node-Level Processing

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Background: Autism spectrum disorder (ASD) is a neurodevelopmental condition characterised by restricted interests and repetitive behaviours as well as social-communication deficits (Picci et al. 2015). These traits are associated with the atypicality of modular organisation of the functional brain networks (Hull et al. 2017). Previous neuroimaging research demonstrates discrepancies in studies of functional brain modular organisation in ASD resulting from the examination of mixed age groups. Furthermore, alteration in the modular organisation originating from systematic nodal changes are yet to be explored in younger children with ASD. Here we used graph-theoretical measures to examine global and regional modular properties in young children with ASD.

Objectives: To address outstanding questions (a) whether alteration of global modular structure arises from the atypical modular cohesiveness of specific brain regions in children with ASD, and (b) whether alteration in the topological roles of specific brain regions is responsible for atypical modular configuration in children with ASD.

Methods: Six minutes of resting-state BOLD fMRI data (age: 5-12 years, males, IQ>75, right-handed) was obtained from the Autism Brain Image Data Exchange (ABIDE) I and II. A total sample of 34 ASD and 40 typically developing (TD) children matched for age, gender, full-scale IQ, and head motion were selected from only those sites which used a TR=2 for data acquisition. The fMRI data were preprocessed using Data Processing Assistant for Resting-State fMRI (DPARSF) toolbox (Chao-Gan et al., 2010). We used Louvain community detection method (Blondel et al. 2008) and normalised mutual information method (Kuncheva et al., 2004) to study the group differences in global modular organisation networks and modular composition, respectively. To investigate the group differences in modular connectivity and topological roles of nodes we used measures namely participation coefficient and within-module degree (Guimerà & Amaral, 2005).

Results: The ASD group showed significant differences in the global modular organization measures - global modularity, average modular size, and number of modules (p<0.05, FDR corrected) compared with the TD group (Table 1). At the global level, we observed significant similarity in modular composition across groups, however at subject-level and node-level analyses significant group differences of network structures (FDR corrected, p<0.05) were shown to be contributed to by nodes of default-mode (DMN), salience (Sal), and sensorimotor (SM) networks. Furthermore, in ASD, a significant increase in between-modular connectivity and a decrease in within-modular connectivity was observed at the nodal level contributed to by nodes from DMN, SM network, and Visual, and Limbic networks respectively (p<0.01; FDR corrected). Functional cartography revealed alteration in topological roles of nodes in ASD group (FDR
corrected, p>0.001) (Fig & table 1). The follow-up analysis showed that nodes that switched their roles were from DMN, Sal, and SM networks.

Conclusions: We demonstrate that alterations in topological roles and modular cohesiveness of brain regions anchored in DMN, SM and Sal networks possibly result in atypical global network organisation in children with ASD. Taken together our findings contribute to the growing body of literature suggest that alterations in nodal topology may start occurring at very early ages in children with ASD.

409.025 (Poster) Altered Signal Complexity in Children and Adolescents with ASD
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Background: Autism spectrum disorder (ASD) is a neurodevelopmental condition present in 1% of the global population, impairing the daily functioning of affected people. ASD is associated with cognitive and behavioral symptoms. In addition, severe electrophysiological alterations have been found in ASD, characterized by cortical hyperexcitability. This hyperexcitability is thought to be caused by an imbalance between excitatory and inhibitory cortical mechanisms. Previous literature has shown that electrophysiological activity measured by electroencephalogram (EEG) during resting-state is perturbated. Indeed, patients with ASD show lower power in the alpha frequency band, the prominent oscillations in humans during resting state, as well as higher gamma power. Furthermore, signal complexity, which is considered a biomarker for brain maturation in many neurodevelopmental disorders, is lower in patients with ASD compared to controls, suggesting developmental deviations in this population. However, to our knowledge, no study has explored signal alterations in higher complexity scales.

Objectives: The aim of this study was to analyze power spectral density (PSD) in frequency bands of interest (alpha and gamma), as well as signal complexity in individuals with ASD.

Methods: In this study, the EEG power and signal complexity of 43 participants with ASD aged between 5-17 (12.6±3.57) were compared to 54 neurotypical (NT) controls aged between 5-18 (9.56±3.37). All participants with ASD were verbal and their intellectual quotient (IQ) ranged from 44 to 124 (93.88±16.65).

Results: PSD results showed that patients with ASD had lower alpha power in frontal, parietal and occipital regions, and higher gamma power in fronto-central and frontal regions. Furthermore, signal complexity was reduced in patients with ASD compared to NT controls, especially in higher scales (21-40). Finally, correlation analyses showed a positive association between age and signal complexity, as well as between IQ and signal complexity in ASD patients and NT controls.

Conclusions: Our results confirm that patients with ASD have altered brain activity in the alpha and gamma frequency bands. This study was also the first to show lower signal complexity in higher scales in this population, suggesting deficits in long-range connectivity. Those results have been previously reported in fragile X syndrome, a genetic disorder known as the most common monogenetic cause of ASD. Lastly, the positive relationships between signal complexity and age, and signal complexity and IQ suggest that signal complexity is sensitive to brain maturation and functioning not only in NT controls, but also in a population of individuals with ASD.

409.026 (Poster) Amygdala fMRI Activation and Autism Symptomology in Sleeping Infants

Background: Autism Spectrum Disorder (ASD) is rarely diagnosed before two years of age and the search to discover the emergence of its early symptoms and causes has been challenging. To accurately predict which infants will develop behavioral characteristics that impact quality of social interactions, sensitive and specific biomarkers need to be discovered.

Objectives: To develop an fMRI task that 1) activates the amygdala, orbital frontal cortex and hippocampus in sleeping infants and 2) is sensitive to behavioral symptoms considered to be putative signs of ASD in infants.

Methods:
All study participants had a low likelihood of developing ASD (i.e., no first-degree relatives with ASD). Parents were administered the Autism Parent Screen for Infants (APSI) and the Vineland Adaptive Behavioral Scales – 3. MRI was performed under natural sleep with COVID safety protocols. Twenty-five infants, 14 male, 11 female, mean age = 7.4 months, SD=.64, provided valid fMRI data. **fMRI task.** Olfactometer tubes were positioned toward the infant’s nose to present phenylethyl alcohol, a rose-like pure odorant that selectively stimulates the olfactory nerve. Olfactometer equipment setup was as previously described [1]. Two block design runs were collected with four nine-second olfactory trials separated by an inter-trial interval (ITI) of 18 second (task duration, one minute, 48 seconds) [1]. The rose-like odorant, phenylethyl alcohol (concentration ≥99% v/v; Sigma-Aldrich) mixed with plain air was administered. Quiet BOLD fMRI scans were obtained on a 3T Philips Elition X with a 32-channel head coil (TR/TE=1500/30ms, 2.5 mm3 isotropic, MB=3, SENSE factor=2, 72 dynamics). Preprocessing and analyses were performed using FSL. Preprocessing included motion correction, brain extraction, detrending, distortion correction, and registration to the 7.5 month infant template [2]. A basis function with an optimized hemodynamic response for infants [3] was generated using “Make_flobs” and entered into the GLM. Odor scans were combined at the individual level using fixed effects. FLAME was used for the higher-level group mean contrast and thresholded at z > 2.3 (voxel height), uncorrected. We analyzed the relationship between olfactory activation and parent-reported autism characteristics (APSI). APSI total score was entered as a regressor variable into a whole-brain, mixed-effects FLAME model thresholded at z > 2.3 (voxel height), uncorrected.

Results: The APSI mean total score was 7.72, SD = 4.07, range = 2-20. Group analyses conducted using a whole-brain field-of-view yielded significant activation across primary and secondary olfactory cortices (Fig. 1A) including the amygdala, orbital frontal cortex, hippocampus, piriform, thalamus, and cerebellum. Higher APSI total scores were associated with higher bilateral amygdala (Fig. 1B) and occipital cortex activation.

Conclusions: Preliminary results indicate amygdala activation to our odor fMRI paradigm is related to behavioral characteristics that confer a greater likelihood for developing ASD. Further longitudinal research with a larger group of infants with both high likelihood and low likelihood of ASD is required to confirm this correlation and determine whether this imaging approach can help anticipate the future onset of atypical socioemotional behaviors.

**409.027 (Poster) Attribution of Salience to Social Versus Nonsocial Stimuli Differs in ASD and TD Youth**

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**Background:** Challenges with social and sensory information are core features of autism spectrum disorder (ASD) and atypical sensory processing may contribute to social challenges (Hamilton et al., 2018). Previous studies have indicated that sensory over-responsivity (SOR) in ASD is related to hyperactivation in the amygdala and reduced downregulation of the amygdala by the orbitofrontal cortex (OFC) during mildly aversive stimuli (Green et al., 2015). Further, SOR is thought to be associated with over-attrition of salience to extraneous sensory information (Green et al., 2016). For typically developing (TD) youth, both the amygdala and OFC are critical components in the brain circuit responsible for salience attribution of social and sensory information (Zalla et al., 2013; Gothard et al., 2022). This study examined amygdala and OFC neural activation during mildly aversive social compared to nonsocial stimuli to better understand how increased attribution of salience to socially irrelevant sensory information in ASD could contribute to difficulties in social interaction.

**Objectives:** To determine differences in brain responses during exposure to mildly aversive social versus non-social auditory stimuli in youth with and without ASD.

**Methods:** Twenty-one ASD and 25 TD controls, age 10-17 years, were presented with four stimulus conditions in a counterbalanced block design fMRI paradigm: social auditory, nonsocial auditory, social auditory+tactile (joint), and nonsocial auditory+tactile (joint). Social and nonsocial stimuli were matched for aversiveness level based on pilot testing and consisted of sounds of children screaming in play and white noise, respectively. The tactile stimulus was a scratchy sponge rubbed on participants’ inner arms. A region-of-interest approach was used to extract right and left amygdala and OFC parameter estimates (PEs) from each of the four conditions. Repeated-measures analyses of variance were conducted using PEs with social relevance of stimulus (nonsocial vs. social), stimulus type (joint vs. auditory), and laterality (right vs. left) as within-subject factors as well as diagnostic group (ASDs vs TD) as a between-subject factor. Full-scale IQ, age, and sex were tested as covariates and included if significant at p<0.1.

**Results:** There was a significant interaction between diagnostic group and social relevance, indicating that the TD group increased both amygdala and OFC neural response in the social compared to the nonsocial condition whereas the ASD group did so in the nonsocial compared to the social condition. Furthermore, there was a significant three-way interaction between diagnostic group, social relevance of stimulus, and laterality of OFC neural activity, with most of the significance driven by the left OFC. There were no other significant main effects or interactions.

**Conclusions:** The TD group showed selective activation of attention and emotion-regulation regions to social compared to nonsocial stimuli, indicating greater salience attribution to socially relevant information. Conversely, the ASD group showed increased selective
activation of attention and emotion-regulation regions to nonsocial compared to social stimuli, which suggests an over-allocation of attention to the general aversiveness rather than the social significance of sensory information. This challenge with filtering out extraneous information could contribute to difficulty prioritizing socially significant information in youth with ASD.

409.028 (Poster) Atypical Neural Adaptation to Vocal and Non-Vocal Sounds in Autism

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Background:

Atypicalities in auditory change detection have been demonstrated several times in autism through the Mismatch Negativity (MMN) (Chen et al., 2020). Recently, it was proposed that differences in the MMN response to deviant stimuli may actually result from difficulties to adapt to the standard stimuli that precede them. At the brain level, neural adaptation is characterized by a decrease in activity when the number of repetitions of a same sound increases, and can be measured with Auditory Evoked Potentials (AEPs) through the modulation of P1 and N100 amplitude. Studies on autistic individuals showed a lack of modulation of brain responses to pure tones (Kolesnik et al., 2019) and to human sounds (Ruiz-Martinez et al., 2020), but these studies used oddball paradigms that are not designed to specifically study adaptation. Here, we propose to use the roving paradigm (Baldeweg et al., 2004), which allows to measure the Repetition Positivity (RP), the preferred cue for studying neural adaptation.

Objectives:

The objective of the current study was to characterize the RP and the dynamic of adaptation to vocal and complex non-vocal sounds in autistic adults (ASD), and to compare them to typically-developing (TD) adults.

Methods:

Adaptation to different types of 300ms sounds (voice and complex non-vocal controls composed of the fundamental and first fourth formant frequencies) was measured through the modulation of P1, N100 and RP in a roving paradigm. Sounds were repeated in trains of 4, 8 or 14 repetitions while measuring brain response with 64 active electrodes. Eight autistic and fifteen typically-developing adults were included.

Results:

The comparison of the RP amplitude between TD and ASD groups revealed a significant difference ($\chi^2(1)=18.13$, $p<.001$, $\eta^2=.26$). RP was barely observed in ASD, indicating no adaptation to either sound category. However, the RP is a difference wave calculated by subtracting the response to the minimum of repetitions from the maximum, without considering the dynamic characterized through the N100 and P1 amplitude modulation.

When looking at intermediate repetitions, for non-vocal sounds, in TD, the N100 amplitude was modulated after 9 to 11 ($p<.05$) until 12-14 repetitions ($p<.01$). In ASD, no modulation of the amplitude was observed regardless the number of repetitions ($p>.05$), confirming findings from previous subcortical study (Font-Alaminos et al., 2020).

For vocal sounds, in TD, 12-14 repetitions were necessary to observe a P1 amplitude modulation ($p<.05$). In contrast, it varied in ASD from 5-8 ($p<.05$) to 9-11 repetitions ($p<.05$), but returned to its original level in response to 12-14 repetitions ($p>.05$) indicating an instability of adaptation.

Conclusions:

The number of repetitions and the social nature of sounds appeared to influence the adaptation process and its dynamic in our sample. The lack of stabilization of habituation in ASD participants might contribute to the atypical detection of changes and the need for sameness in ASD.

Even in a small sample, this lack of stabilization in ASD participants seems quite robust as it was found for both sound categories and should be confirmed on a larger sample, to be collected as part of final study.
Background: Autism (AT) and schizophrenia (SZ) are both characterized by differences in social cognition and behavior compared to neurotypical (NT) development (Fernandes et al., 2018). These conditions are hypothesized to have common neurobiological features, however, event-related potential (ERP) studies of social-emotional processing in these populations have yielded mixed results (Levy et al., 2021). The Late Positive Potential (LPP) ERP is an index of sustained and motivated attention to salient stimuli (Liu et al., 2012; Schupp et al., 2000). Individuals with SZ demonstrate attenuated LPP amplitudes to emotionally valenced stimuli, although effect sizes are small (Castro et al., 2019). Few studies have examined the LPP in autistic individuals (Keifer et al., 2019) and no study to date has compared the LPP across AT, SZ, and NT.

Objectives: This study examined LPP amplitude in response to happy and fearful facial expressions in autistic adults, neurotypical adults, and adults diagnosed with schizophrenia using a gaze-contingent paradigm.

Methods: Participants included 68 adults (31 NT, 25 AT, 12 SZ) aged 18-39 years (M=25.41, SD=5.82) with FSIQ≥70 (M=107.40, SD=16.78) as measured by the WASI-2 (Wechsler, 2011). Diagnoses were confirmed using the ADOS-2 (Lord et al., 2012) and the PANSS (Kay et al., 1987). Electroencephalogram data were recorded using 128-channel HydroCel Geodesic Sensor Nets at 1000Hz and simultaneous eye-tracking data were recorded using SR-Eyelink at 500Hz while participants passively viewed a gaze-contingent paradigm. Neutral adult faces were presented and after participants fixated on the eyes for 500ms, it displayed an emotional expression (happy or fearful) for 1000ms. As such, participants were fixating on the eye-region when the emotional face appeared. Data were processed usingERPLAB (Lopez-Calderon & Luck, 2014), and the LPP was scored as mean activity between 300-1000ms after emotional face onset.

Results: Results of a two-way ANOVA examining the effect of group (NT, AT, SZ) and facial expression (happy, fearful) on LPP amplitude revealed a significant difference in LPP amplitude by group (F(2,130)=4.427, p<.05) such that the AT group evinced larger LPP amplitudes than the NT and SZ groups (p's<.05, Figure 1). No significant differences were found in LPP amplitude by facial expression or the interaction of group and expression (p's>.4).

Conclusions: In contrast to previous literature (Benning et al., 2016), autistic adults demonstrated increased elaborative processing of emotional facial expressions compared to neurotypical adults and adults with schizophrenia. Adults with schizophrenia did not differ in LPP amplitude from the NT group, although the sample size was small. Importantly, the current paradigm was gaze-contingent, meaning that it required participants to look to the eye-region before it advanced. While social neuroscience studies have long focused on attenuated processing of social stimuli in autism, autistic individuals have qualitatively reported hypersensitivity to eye contact (Trevisan et al., 2017). The current results align with the theory that autistic individuals may experience amygdala-related hyperarousal when making eye-contact (Stuart et al., 2022). Future studies should continue to evaluate the role of hyperarousal in social-emotional processing in autistic individuals.
**Objectives:** We evaluate and compare the overall background slope of the resting state EEG power spectrum in children with the above disorders, as well in typically developing (TD)controls.

**Methods:** Resting state EEG data acquisition is currently ongoing from children with PMS (n=21), TSC (n=18), PHTS (n=6), as well as age-matched typically developing controls (TD, n=7) across six sites as part of the Developmental Synaptopathies Consortium. Data collection is standardized across sites and pre-processed using the Harvard Automated Preprocessing Pipeline for EEG (HAPPE) which is embedded in the Batch EEG Automated Processing Platform (BEAPP). To evaluate the aperiodic slope of the power spectrum, we used the Fitting Oscillations and One Over F (FOOOF) algorithm. To compare slope across groups, we used an independent Kruskal Wallis test with post-hoc analysis using Bonferroni correction.

**Results:** Children with PMS had significantly lower values of slope when compared with TSC (adj. p = 0.02) and PHTS (adj. p= 0.024). There was a trending difference when PMS was compared against the TD group, however this did not survive correction.

**Conclusions:** Flattened slope in PMS may reflect a shift to local rather than global processing, as well as a disruption in the balance of excitation/inhibition activity. Future analysis will assess relationships between slope and phenotypic measures between the different mTOR pathway related disorders. These analyses could also be considered for back translation applications to understand basic differences in neural circuit function between the disorders.

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**Background:**
Cognitive flexibility helps us to navigate through our ever-changing environment. Difficulties in cognitive flexibility may be associated with rigid behavior as often described in individuals with ASD. Reversal learning paradigms can be used to examine this type of behavior and assess individual performance. Computational modeling of behavioral performance and analysis of model parameters allows for a closer linking of biologically plausible models, psychological mechanisms, and measurable behavior. Although such modelling approaches are increasingly used in cognitive neuroscience, their application to typically developing (TD) samples and to individuals with neurodevelopmental conditions such as ASD is still scarce.

**Objectives:**
We combined behavioral modelling of a reversal learning task with fMRI neuroimaging in TD and ASD individuals to investigate the neural substrates of cognitive flexibility and their modulation by the context of the learning feedback.

**Methods:**
We used hierarchical Gaussian filter modeling to analyze reversal learning data in 28 TD children and 25 TD adolescents and the effect of various feedback types during fMRI scanning, and additional behavioral runs outside the scanner. Data collection and analysis of children and adolescents with ASD is ongoing.

**Results:**
The behavioral results demonstrate that children make more overall errors and regressive errors (when a previously learned response rule is chosen instead of the new correct response after the initial shift to the new correct target), but less perseverative errors (when a previously learned response set continues to be used despite a reversal) adolescents. Analyses of the extracted model parameters of the winning model revealed that children seem to use new and conflicting information less readily than adolescents to update their stimulus-reward associations. Furthermore, a subclinical index of rigidity in everyday life (parent-ratings) is related to less explorative choice behavior during the probabilistic reversal learning task. Preliminary fMRI analyses show that TD adolescents compared to TD children show a greater reward prediction error (RPE) response in the amygdala across feedback conditions, and a greater RPE response in the dMPFC in a social feedback condition.

**Conclusions:**
Combining behavioral modelling and neuroimaging reveals deeper insights into the behavioral and neural mechanisms of cognitive flexibility and developmental shifts in TD individuals. Therefore, it is a valuable tool for the investigation of neurodevelopmental samples with known difficulties in cognitive flexibility and the relation to every-day clinical behavioral measures.

409.032 (Poster) Brain Oscillations of Face and Gaze Processing in Children with Autism Spectrum Disorder
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Background: In autism spectrum disorder (ASD), processing of human faces and eye gaze differ from that of typically developing individuals. The manifestation of these differences appears to consist of complex trajectories that are affected by brain development as well as overall intellectual capacities. Thus, there is need to assess the brain basis of face and gaze processing across different ages of children with ASD.

Objectives: The current study sought to reveal distinct patterns of cortical activity in children with ASD in response to faces and direct eye gaze. We aimed to explore different frequencies of event-related brain oscillations which, to our knowledge, have not been previously investigated in the context of socially meaningful stimuli in the selected population.

Methods: We investigated brain activity during the processing of faces and non-face objects (faces vs. cars) as well as eye gaze (direct vs. downcast gaze) in children with ASD (age: 4.7–8.3 years, M(SD) = 6.5(1.0); N = 17) using electroencephalography (EEG). Cortical activity was investigated through event-related theta-, alpha-, beta- and gamma-frequency power from segments of EEG following a four-second period after stimulus onset. Control participant groups included typically developed (TD; age: 4.5–8.4 years; M(SD) = 6.3(1.0); N = 16) and developmentally delayed (DD; age: 5.7–8.1 years; M(SD) = 6.9(0.9); N = 11) children. Estimated intelligence quotient was matched across ASD and DD groups [M(SD)=59.4(11.7)].

Results: For the ASD group, maximum difference between face and car condition centered at parieto-occipital electrodes in the theta frequency band (5–7 Hz, permutation test p-value = 0.049, t(16) = 2.69, p = 0.016, d = 0.67, Figure 1). For the TD and DD groups, no difference between face and car condition were found in the theta band (cluster probabilities > .30). A trend for increased theta-band activity in response to direct vs. downcast gaze was also found for the ASD participants [t(14) = 2.00, p = 0.065, d = 0.53]. Frontal alpha-band activity was additionally found in ASD and DD participants in response to face vs. car stimuli (permutation test p-values < 0.05).

Conclusions: The results point to the role of theta-band oscillations, previously implicated with attention allocation, in processing of faces in children with ASD. An interpretation of heightened theta-power in children with autism is proposed in the light of increased processing demands related directly to intrinsic deficits in specialized brain networks, or to limited expertise gained in facial processing. At this point, this interpretation of overcompensated processing warrants further investigation to be confirmed. Alternatively, the role of oscillatory activity in ASD children corresponding to the normative theta-band (4–8 Hz), might relate to some functionally different process such as down-tuned alpha-band activity (8-13 Hz).

409.033 (Poster) Cardiac Autonomic Imbalance Is Manifested across the Brain-Heart Axis in Children with ASD: Insights from Effective Connectivity Modelling

Background: Because of its negative link to stress and anxiety, as well as its positive link to a wide range of positive psychological outcomes, cardiac autonomic balance (denoted by heart rate variability, HRV) is increasingly considered as a marker of mental health and homeostasis. In healthy adult subjects, HRV has also been shown to covary with changes in connectivity between brain regions of the central autonomic network (CAN), demonstrating a functional integration between cardiac and neural systems for maintaining and regulating homeostasis. The high-frequency component of HRV (HF-HRV) in particular, exclusively denoting parasympathetic (“vagal”) outflow, is associated with increased functional coupling between the medial prefrontal cortex (mPFC) and amygdala, thought to reflect a prefrontal top-down inhibition of amygdala-centered circuits. In children with ASD, extremely high prevalence rates of anxiety and stress are noted. Autonomic imbalance at the level of the heart is often reported, yet its extent, functional relevance and the role of the CAN network herein remain undetermined.

Objectives: We aim to investigate the occurrence of cardiac autonomic (im)balance as well as associated differences in intrinsic CAN connectivity in 59 school-aged children with ASD (8-12 y/o) compared to 39 age- and IQ-matched typically developing (TD) children.
Methods: Cardiac monitoring was performed during concurrent neuroimaging while at rest (resting-state MRI). We focused on the HF-HRV component (0.24-1.04 Hz) as an index of cardiac vagal tone. Besides addressing functional connectivity between CAN brain regions, spectral dynamic causal modelling (spDCM) was adopted to specifically delineate effective connectivity within the CAN. As such, we can explicitly model the influence that one node (mPFC) exerts over another (amygdala) within a network model of causal neural dynamics. Parametric empirical Bayes (PEB) procedures were used to test how individual (within-subject) neural connections within the CAN relate to different between-subjects effects (group, HF-HRV%, parent-reported SRS scores).

Results: At the group level, we show similar vagal cardiac-regulation in children with and without ASD during rest. Yet lower parasympathetic outflow at the level of the heart was found in ASD children with more severe ASD symptomatology, indicative of higher autonomic arousal. No group differences in CAN functional connectivity could be detected, but the effective connectivity analyses demonstrated increased excitatory bottom-up connections from the amygdala to the mPFC in ASD children, combined with increased excitatory top-down mPFC-amygdala coupling. Neuro-cardiac integration between functional amygdala-vPFC connectivity and HF-HRV was only shown in TD (r=-.36, p=.03), but not in ASD children (all p>.38). The spDCM analysis in combination with PEB estimation did show however that with increasing HF-HRV, the overly excitatory amygdala connections also decreased in children with ASD.

Conclusions: Despite no overall differences in cardiac vagal tone between TD vs. ASD children, the effective connectivity analyses demonstrated increased excitatory bottom-up amygdala connections within the CAN network in children with ASD. Most importantly, higher cardiac vagal tone was related to lower ASD symptomatology and less excessive excitatory amygdala connections, providing further evidence for a functionally integrative brain-heart system that can be addressed as a marker of disrupted homeostasis in children ASD.

409.034 (Poster) Clinically Relevant Association between Visual EEG Abnormalities and Excitation/Inhibition Ratio in the Longitudinal European Autism Project

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**ABSTRACT**

**Background:** Imbalances between synaptic excitation and inhibition during the resting state may destabilize sensory and cognitive information processing in autism spectrum disorder (ASD). The various genetic and cellular mechanisms implicated in ASD predict that such imbalances will differ in directionality and may be an element in understanding clinical heterogeneity. To test these claims at the clinical level, we recently applied a new functional measurement of network-level E/I ratio (fE/I) and revealed that fE/I variability was enhanced in ASD and related to visually-graded EEG abnormalities ranging from slowing to epileptiform activity (1) (2), which in literature also have been associated with E/I imbalances (3, 4). Here, we replicate and expand on these findings in the large EU-AIMS compilation of EEG recordings in ASD.

**Objectives:** To determine whether variability in brain E/I set-points may explain elements of the clinical heterogeneity in ASD and corroborate the impact of EEG abnormalities towards E/I imbalances in ASD.

**Methods:** We divided the sample (n = 476) into two age groups, children (age 6–18 years) and adults (age 19–31 years), taking into account the differences in EEG development throughout the lifespan (3). From this, EEGs of 146 children with ASD and 104 neurotypical children were analyzed. We quantified the proportion of EEG abnormalities according to the atlas of Luders and Noachtar (1), evaluated their influence on spectral (relative power), long-range temporal correlations (DFA exponent) and functional excitation-inhibition ratio (fE/I), and their association with core symptomatology in these groups.
**Results:** We found that visual EEG abnormalities were associated with lower fE/I and lower power of alpha oscillations, indicating inhibition dominated networks, not only in children with ASD (n = 23) but also in the small subset of neurotypical children with abnormal EEGs (n = 14). Clinical relevance of this association was indicated by a positive correlation between fE/I and the Vineland Adaptive behavior scores in ASD without EEG abnormalities. In contrast, in those with abnormal EEG, fE/I showed a positive correlation with repetitive behavior.

**Conclusions:** In sum, we corroborate an association between qualitative and quantitative EEG proxies of E/I balance. We confirm that the presence of inhibition-dominated networks is associated with the presence of EEG abnormalities. Our findings further indicate that this EEG phenotype has value to predict the impact of E/I imbalances on behavioral outcomes, which holds promise for stratification purposes in clinical trials.

**References**


**409.035 (Poster) Comparing Mismatch Negativity between Autism and Schizophrenia: Using Machine Learning Model to Differentiate the Two Conditions**

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Background: Autism spectrum disorder (ASD) Schizophrenia (SCZ) are frequently co-occur, that challenges differential diagnosis. Mismatch negativity (MMN) and P3a abnormality were reported both in SCZ and ASD. It is uncertain whether EEG biomarkers can differentiate ASD from SCZ.

Objectives: This study aims to Investigate whether MMN and P3a parameters can differentiate ASD from SCZ, and exams the features that can better differentiate ASD, SCZ, and typically developing controls (TDC).

Methods: We used the CatBoost to classify the three groups, i.e., ASD vs. TDC (N=86:98), SCZ vs. TDC (48:44), and SCZ vs. ASD (50:86). After the ground channels were removed, 151 features remained. We split the data into training and testing sets in a ratio of 7:3. Hyper-parameter tuning was processed in training set to yield the best hyper-parameter set. We calculated the feature importance by permutation for each classification.

Results: All MMN/P3a features well differentiated SCZ/TDC (AUC=0.84) and ASD/SCZ (AUC=0.76), but not ASD/TDC (AUC=0.5). Floating mean amplitude overall had the best performance in differentiating SCZ/TDC (AUC=0.87). Amplitudes, rather than latency, could differentiate SCZ/ASD (AUC=0.72 vs. 0.58). As for feature importance, fMMN latency is the best feature to differentiate ASD from SCZ. Peak amplitude/latency are more important features for differentiating SCZ and TDC.

Conclusions: Findings suggest that the MMN and P3a parameters might help to differentiate ASD from SCZ, and differentiate SCZ from TDC with acceptable accuracy, implying that MMN and P3a might assist in differential diagnosis of ASD and SCZ.

**409.036 (Poster) The Relationship between Resting-State EEG Graph Metrics of Network Efficiency and Social Cognition in Autism**

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Background:
Autism is associated with specific social cognition characteristics and is thought to be underpinned by differences in functional network organization in the brain. However, whether long-range and/or local connectivity is different in autistic adolescents compared to non-autistic adolescents remains unclear. Moreover, the relevance of functional network organization to social cognition is yet unknown.

Objectives:

We first aimed to identify autism-related characteristics of resting-state networks in adolescence, a life-phase critical for social development. Second, we took a first step in exploring relationships with empathy and theory of mind (ToM), aspects of social cognition commonly implicated in autism.

Methods:

Data was recorded as part of EU-AIMS LEAP. We constructed functional connectivity networks based on weighted Phase Lag Indexes (wPLI) using resting-state EEG data of 68 (16 females) autistic and 56 (19 females) nonautistic adolescents. Social cognition measures and graph metrics describing whole-brain network organization were compared between groups. Subsequently, we investigated relationships between characteristics of aforementioned graph metrics and measures of social cognition.

Results:

Autistic adolescents showed lower empathy and ToM ability as measured by the Empathy Quotient (EQ) and the Reading the Mind in the Eyes task (RMET) compared to nonautistic adolescents. Moreover, they had reduced global efficiency in the alpha band, indicating less efficient long-range information integration in the brain. Clustering coefficient (overall network efficiency) and small-worldness (segregation) did not differ between groups. In adolescents with high autistic trait severity, lower alpha global efficiency was associated with higher empathy, while this association was significantly less strong for those with low autistic trait severity. Additionally, we observed a borderline significant ($p=.053$) relationship between higher global efficiency and better ToM ability as measured by the RMET.

Conclusions:

Our results suggest less efficient integration of information across distant regions of the brain in autistic compared to nonautistic adolescents, possibly indicating differences in network maturation. Exploratory network-behavior analyses suggest that long-range integration may be relevant to some of the social cognition characteristics associated with autism. These tentative findings offer a promising avenue for further research into the biological underpinnings of the social characteristics associated with autism.

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**409.037 (Poster) Development of Self-Referential Encoding in Autism Spectrum Disorder**

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**Background:** Social cognition is commonly impaired in autism spectrum disorder (ASD), significantly affecting an individual’s relationships and well-being. We must understand the roots of this deficit in the brain and behaviour to develop effective targeted interventions. One such root factor may be episodic memory, memory for past events and experiences, known to be selectively impaired in ASD (Gaigg et al., 2014). During social interactions, one must recall previous interactions to infer mental states of social partners. A reduced ability to process self-related information may underlie this memory deficit. We can investigate the interaction between the self and episodic memory through the idea that information encoded in relation to the self is better remembered, termed the self-referential effect (SRE). Previous studies demonstrated a diminished SRE in individuals with ASD (Grisdale et al., 2014). To date, it remains unclear how self-referential memory encoding is supported in the brain in children with ASD.

**Objectives:** We aimed to compare the SRE of recollection between neurotypical (NT) children and children with ASD. Furthermore, we compared how the brain engages in episodic encoding and the SRE in each group. We expected that ASD children would show less self-referential facilitation associated with diminished activation in the midline cortical and lateral parietal regions compared to NT children (Leshikar and Duarte, 2013).

**Methods:** Forty children with ASD with IQ above 25th percentile between the ages of 8 and 12 years were recruited, along with 40 age- and sex- matched neurotypical children. In the MRI scanner, participants viewed trait adjectives paired with either a picture of a smiley face representing themselves or a picture of a Despicable Me minion (other). Children were asked to think about whether the trait adjective described the referent and select yes or no. After the scan, participants were tested on their recognition of the words using the Remember/Know paradigm (Yonelinas and Jacoby, 1995).

**Results:** Comparing recognition accuracy for remember trials in the self versus other conditions in a preliminary sample of 11 children with ASD (mean age 12.01 ± 2.74) and 29 NT children (mean age 12.55 ± 2.71) revealed a greater SRE for NT children compared to the
ASD group (Figure 1A; t(38) = 2.21, p = .033). Our preliminary imaging results include data from 10 children in each group (NT: mean age 10.70 ± 1.61; ASD: mean age 11.92 ± 2.87). The NT group showed expected activations in mPFC and precuneus for self-referential processing, while the ASD group showed only the anterior activations (Figure 1B). Subsequent memory activations appeared in the mPFC and posterior cingulate in the NT group and in the posterior hippocampus in the ASD group (Figure 2).

Conclusions: These preliminary data provide evidence for a reduced SRE in children with ASD associated with diminished midline cortical activation. This research informs our understanding of the neural roots of social cognitive impairments in ASD which may inform interventions to improve self-relational processing, episodic memory, and in turn, social cognition to lessen the impact of ASD on the personal life of the individual.

409.038 (Poster) Diagnostic and Familial fcMRI Differences in 24-Month-Olds with and without Autism


Background: We presently know very little about brain functional connectivity differences across autism spectrum disorder (ASD) and typical development in very young children. Characterization of neural correlates for the development of ASD may improve early identification, enable future intervention trials, and lead to the validation of biomarkers for demonstrating treatment engagement.

Objectives: To test for potential ASD diagnostic and familial likelihood group-related differences in functional connectivity at the whole-brain and network level in 24-month-old children at high (HL) and low familial likelihood (LL) for developing ASD.

Methods: We conducted cross-group comparisons for high likelihood ASD-positive (HLP: has clinical best estimate diagnosis of ASD, N=23) and -negative (HLN, N=91) and low likelihood ASD-negative (LLN, N=27) children with Infant Brain Imaging Study (IBIS) Network fcMRI data. Advances in fcMRI processing increased yield for usable data, allowing for these tests. Analyses followed a pre-specified analytic plan: 1) GLM-based tests on jackknifed individual-to-group (within/between) fcMRI matrix correlations, 2) tests of brain-wide network structure differences using normalized mutual information (NMI), 3) cross-group tests of brain-wide differences using object oriented data analysis (OODA), 4) network-level tests for group differences using our updated fcMRI enrichment approach, 5) whole-brain cross-group classification using support vector machine (SVM), 6) testing for differences in network structure with jackknifed comparisons for NMI for individual-to-group network derivations, 7) tests for cross-group differences in brain region of interest (ROI) composition in specific functional networks using Jaccard metrics, and 8) cross-group clustering based on individual differences in network ROI composition.

Results: OODA (alpha = 0.0167, 3 comparisons) revealed a significant difference between HLP and LLN fcMRI matrices (p = 0.012). HLP trended for difference from HLN (p = 0.047). HLN and LLN matrices did not differ (p = 0.225). Post hoc testing did not identify contributions from specific networks. fcMRI enrichment using an ANOVA link function found strong signal for the posterior cingulate default mode network 1 (pcDMN1) – temporal default mode network (tDMN) pair (p = 0.0070) that survived a machine learning secondary vetting procedure (p = 0.038). fcMRI enrichment for post hoc Tukey-corrected t-tests on nominally significant omnibus ANOVA connections in the pcDMN1 – tDMN pair, showed: HLP differed from HLN (p = 0.0461). HLP did not differ from HLN (p = 0.2254). HLN differed from LLN (p = 0.0004). A secondary t-test on pcDMN1 – tDMN connectivity showed HL (HLP and HLN combined) differed from LL (p = 0.0013). SVM separated HLP from HLN: accuracy = 98.2% (96.3-100), PPV = 91.7% (91.7-100), NPV = 100% (96.6-100). Observed PPV and NPV exceeded any values produced with 1000 data reshuffles. Consensus features scattered across brain networks. A crystalized version of the classifier built with leave-out methods accurately classified LLN matrices (it never trained on) “ASD-negative:” accuracy = 88.5%, PPV = N/A, NPV = 100%. Analyses 1, 2, 6, 7, 8 produced no significant results.

Conclusions: We found evidence for a familial difference between HL and LL subjects involving reduced DMN connectivity, and ASD diagnostic differences involving functional connections distributed across brain networks in 24-month-old infants.

409.039 (Poster) Differences in Oxytocin Receptor Genes in Children with ASD : Impacts on Symptom Severity through Brain Functional Connectivity
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Background:

Oxytocin receptor gene (OXTR) is one of the potent genes suggested to be involved in the pathogenesis of Autism Spectrum Disorder (ASD). However, it is unclear through which mechanisms genetic and epi-genetic diversity affects clinical symptoms of ASD. Imaging genetics of OXTR is expected to serve as a bridge between genetic differences and phenotypes in ASD.

Objectives:

In this study, we aimed to identify the relationship between genetic/epi-genetic differences, resting-state functional connectivity (rs-FC), and clinical severity in ASD children.

Methods:

For 41 ASD children and 50 typically developing (TD) children (mean age 4 and 7 years respectively, 32 (78%) and 23 (46%) boys respectively), SNP genotyping at rs2254298 and rs53576, and estimations of methylation level in 2 CpG sites (-923, -934) of OXTR were performed. Using the independent component analysis on fMRI, we classified brain regions into six intrinsic networks and analyzed rs-FC of each network. Autistic symptoms were measured by the Childhood Autism Rating Scale (CARS), the Autism Diagnostic Observation Schedule (ADOS) and the Social Responsiveness Scale (SRS). In addition, social and developmental age were measured. The associations between genetic/epi-genetic information, rs-FC, and clinical scores were explored.

Results:

In ASD children, rs-FC were significantly decreased in default mode network (DMN), cognitive control network (CC), somato-motor network (SM) and visual network (VIS) with risk allele (A) of rs2254298 while the opposite results were found in the TD children. The decreases in rs-FC between CC and CC and rs-FC between CC and SM were negatively correlated with SRS and ADOS respectively. The decrease in rs-FC between SM and VIS was negatively correlated with SRS and positively correlated with developmental age.

Homozygous AA carriers of rs53576 showed lower rs-FC in DMN, CC, SM, VIS and auditory network (AUD) than other genotyped groups in ASD. Similar to rs2254298, the TD group showed opposite results in each network. Decreased rs-FC between DMN and CC showed a negative correlation with ADOS score and a positive correlation with social age, and decreased rs-FC between CC and SM showed negative correlations with both SRS and ADOS.

In the two rs-FCs (Subcortical network (SUB)-DMN and SUB-CC), the higher the methylation level of the CpG site (-924), the lower the linkage strength in children with ASD. On the contrary, hyper-methylation of the CpG site strengthened the rs-FC in TD children. In the ASD group, hyper-methylation related SUB-CC connectivity was negatively correlated with the ADOS score.

Conclusions:

We found that the genetic/epi-genetic alterations of OXTR in ASD were significantly associated with decreased functional connectivity of brain networks related to cognition, sociality, sensory, and movement. In addition, significant associations between rs-FCs and the clinical symptom severity were observed. The results could be interpreted as the differences in OXTR in ASD affect phenotypes such as impaired social cognition and abnormal behavior through changes in brain functional connectivity. In future studies, more in-depth exploration of specific brain regions is required in larger samples.

Differences in Temporal Brain Response in Children Born Preterm and Term and Its Relationship with Social Communication Abilities

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Background:
Due to improvements in neonatal care, a larger number of preterm children survive. However, this leads to increased risk of physical/neurodevelopmental disorders, with higher rates of autism in premature populations (Laverty et al., 2021). For this reason, it is critical to identify potential early neural biomarkers and thus facilitate monitoring, support and early intervention (Green et al., 2017).

Objectives:

To analyze social-selective cerebral response in bilateral temporal areas of children born preterm and term. Our hypothesis was that preterm children would show a different response in regions of interest (ROIs) related with social processing while looking at social dynamic stimuli. Also, we wanted to explore the relationship between brain response and psychological measures to predict future developmental trajectories.

Methods:

This research forms part of an ongoing prospective longitudinal design, where children born preterm and term will be assessed at 12, 18, 24 and 36 months. Only preliminary results at 12 months are presented here. Functional Near Infrared Spectroscopy (fNIRS) was used following the procedure of Lloyd-Fox, et al. (2018) except stimuli were presented without audio. The ROIs were: inferior-frontal gyrus (IFG); anterior-middle-temporal gyrus/superior-temporal gyrus (aMTG-STG); and posterior-superior-temporal sulcus/temporoparietal junction (pSTS-TPJ). Psychological measures were Vineland-III (adaptive behavior); Bayley-III (cognitive and language function); SACS-R (autism screening); and ADOS-2 (autism diagnostic).

Response to stimuli was explored using between-groups t-tests comparing HbO$_2$ concentration changes across ROIs and channels for time windows based on other fNIRS studies (Braukmann et al., 2018). Correlations between ROI HbO$_2$ averages and psychological measures were calculated to evaluate relationships between brain responses and difficulties in development. Furthermore, average HbO$_2$ for social-dynamic and non-social-dynamic stimuli was compared to explore differences in brain response based on ASD screening results and ROIs.

Results:

A total of 67 children (41 preterm; 26 term) were assessed at 12 months. After data processing and cleaning, 36 datasets (25 preterm; 11 term) were valid. Visual inspection of hemodynamic responses showed differentiated patterns between groups in almost all the ROIs, especially in time windows later than 10 seconds after the onset of stimuli. The only significant difference in HbO$_2$ concentration changes was found in the right IFG. Significant HbO$_2$ response differences were found for children failing 3 critical items on the SACS-R (N= 2) compared to 0 failed items (N=17) in the right pSTS-TPJ. Social vs non-social response was also significantly different in these groups for the left MTG-STG.

Conclusions:

These preliminary results suggest a relationship between prematurity and increased IFG involvement in social attention tasks for 12 month children, which other studies connect to ASD (e.g., Chan & Han, 2020). Additionally, results are consistent with recent data from meta-analyses (e.g., Hodgson, Lambon-Ralph & Jackson, 2022) that relate pSTS-TPJ and MTG-STG areas with the processing of social-dynamic stimuli (i.e. theory of mind and face processing, respectively), and suggested that the cerebral response is different based on the social-communication abilities of the child. More data is needed to discuss whether this is particularly associated with premature birth and with the possible future diagnosis of autism.

409.041 (Poster) Differential Neurobiology of Sensory over-Responsivity in ASD and OCD: A Preliminary Analysis

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Background:

Autistic individuals and those with Obsessive-Compulsive Disorder (OCD) often report subjective sensory over-responsivity (SOR)—a predisposition to experience rapid, intense, and/or durable responses to sensory stimuli. To our knowledge, the shared and differential neurobiology of SOR in Autism Spectrum Disorder (ASD) and OCD has not been thoroughly investigated.

Objectives:

To characterize sensory profile differences across ASD and OCD. To investigate neural correlates of SOR via resting-state functional magnetic resonance imaging (rsfMRI).
Methods:

Data were analyzed from 10 autistic participants without OCD and a full scale IQ≥70 (age 26.4 [5.4], range 19-36), 27 participants with OCD but not ASD (age 26.2 [5.1], range 19-36), and 22 neurotypical control (NC) participants without psychiatric diagnosis (age 24.6 [3.1], range 20-31), confirmed via semi-structured psychiatric research diagnostic interview. Autistic participants met Autism Diagnostic Observation Schedule (ADOS-2) instrument classification of ASD. Participants with major medical, neurologic, or comorbid psychiatric diagnosis (e.g., bipolar or schizophrenia spectrum disorder) were excluded. All 3 groups were sex- (all male) and age-matched. Use of psychiatric medication was permitted in autistic and OCD cohorts.

Participants were scanned on a 3.0T Siemens TIM Trio with a 32-channel head coil. Resting-state functional scans were acquired using a high-resolution multiband-accelerated echo-planar sequence for full brain coverage. Preprocessing of functional data was performed using Statistical Parametric Mapping (SPM) v.12 and python and included: gradient distortion correction, realignment of functional images, normalization to MNI template, and 6-mm FWHM spatial smoothing.

The Adolescent and Adult Sensory Profile (AASP) (Brown & Dunn, 2002; Dunn, 2001) is a self-report questionnaire assessing responses to everyday sensory experiences. Following prior work, SOR was calculated using the Sensation Avoiding and Sensory Sensitivity subscales (Podoly et al., 2022).

Between-group comparisons on SOR scores were performed using one-way ANOVAs. Resting-state functional connectivity analysis was performed using the Conn toolbox (Whitfield-Gabrieli & Nieto-Castanon, 2012). Functional connectivity analyses focused on global connectivity which measures, for each participant, the connectivity between a given voxel and every other voxel in gray matter, with higher connectivity reflecting greater neural centrality or “hubness” (Martuzzi et al., 2011; Whitfield-Gabrieli & Nieto-Castanon, 2012) in an area. Group-level analyses interrogated the relationship between SOR scores and global connectivity within the ASD and OCD groups separately using regression. Preliminary connectivity results were thresholded at voxelwise \(p<0.005\) (uncorrected).

Results:

SOR scores were significantly different between the participant groups, \(F(2, 56)=11.9, p<0.0005, \eta^2=0.3\). Tukey post-hoc analysis revealed that both autistic (\(M=2.5, SD=0.5\)) and OCD participants (\(M=2.6, SD=0.6\)) had significantly higher SOR scores than NC participants (\(M=1.9, SD=0.4\)) \((p<0.005 \text{ for both})\). Autistic and OCD participants did not differ in SOR scores \((p>0.5)\).

Analysis of global connectivity indicated that SOR scores were associated with medial orbitofrontal connectivity in OCD but sensorimotor connectivity in autistic participants.

Conclusions:

Autistic individuals and those with OCD reported increased SOR compared to neurotypical control participants. While OCD and autistic participants were similar behaviorally, SOR was associated with distinct group-specific resting-state functional architecture. Overall, findings support SOR as a shared behavioral phenotype in ASD and OCD that may be driven by differential neural circuitry.

409.042 (Poster) Disruptions in Amygdala Activation Are Linked to Eye Gaze Processing in Autism: An fMRI Meta-Analysis

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Background: Social impairments of autism, including reduced eye contact and eye gaze abnormalities, are associated with disruptions in networks involved in social cognition. Previous studies have shown perturbations in social cognitive regions—including the amygdala—during eye gaze processing in autistic versus unaffected controls. However, while prior meta-analytic work has suggested hypoactivation in ‘social brain’ networks during broader social cognition tasks, no meta-analytic study has quantitatively examined the neural correlates across domains of eye gaze processing in autism.

Objectives: The current study examined fMRI studies across domains of gaze processing in autism including eye gaze direction, attention directed towards the eye region, shifts in eye gaze, and viewing of emotionally expressive faces while cued to focus on the eyes. The primary aim was to quantitatively summarize the existing imaging literature to identify convergent patterns of neural disruptions associated with gaze processing in autism.
Methods: The literature review and selection of manuscripts was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PROSPERO: CRD42021239132). Studies investigating gaze processing in autism were identified through a literature search for imaging experiments examining eye gaze, eye movement, and gaze cueing conducted in ASD samples. Searches were conducted using Cochrane, PubMed, Ovid MEDLINE, Embase, CINAHL, PsycINFO, Web of Science, and ERIC. Inclusion criteria included: full text in English and published between January 1990 and December 2021 in a peer-reviewed journal; used task-based fMRI across domains of gaze processing; examined ASD vs healthy control contrasts; and foci of significant activations were reported in standardized stereotaxic space (e.g., Montreal Neurological Institute [MNI] atlas). Region-of-interest studies were excluded. A total of 4,322 articles were selected for screening and 204 for full text review by two independent reviewers. A quantitative synthesis was conducted using Activation Likelihood Estimation, implicated in MATLAB, to identify regions of spatial convergence. Group-x-Condition interactions were conducted and sub-analyses to clarify patterns of hyper- versus hypoactivation and task domains. Non-parametric p values were thresholded using a cluster-level family-wise-error-corrected p<0.05 and a cluster-forming threshold of p<0.001, which were transformed into Z scores.

Results: Twenty-seven experiments from twenty articles met inclusion criteria, comprising 354 autistic individuals (M_age = 19.6 years; 86.4% males; M_Q=111.88) and 348 controls (M_age= 19.5 years; 82.2% males). Experiments involved gaze direction (n = 8) and cueing (n = 12) tasks. Significant activation differences were found in autism versus controls in the left amygdala (MNI coordinates: -24, -6, -20; z-value = 4.2). Sub-analyses showed that aberrant amygdala activation was characterized by patterns of hypo- and hyperactivation in ASD during gaze processing. Additionally, gaze cueing and direction paradigms as well as child and adult samples contributed to this finding.

Conclusions: Consistent with previous findings, eye gaze processing in autism was related to aberrant amygdala activation, which may reflect disruptions in the recruitment of neural resources involved in social cognition including mentalizing, emotion regulation, and/or attentional control.

409.043 (Poster) Unsupervised Data-Driven Stratification of Global Excitation-Inhibition Imbalance Autism Subtypes from EEG Data

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Background: Heterogeneity in autism manifests at multiple scales - from genome to phenotype. While clinical subtyping efforts have shown promise, neural subtyping has been relatively much less explored. However, because neural subtyping is more proximal to the biology, it may yield better insight into autism-relevant neurobiology. In this work we apply a neural subtyping approach to test the excitation-inhibition (E:I) imbalance theory of autism.

Objectives: Here we examine whether autism can be split into robust, generalizable, and stable neural subtypes using an unsupervised data-driven stratification approach applied to E:I-relevant time-series statistical metrics, such as the Hurst exponent (Trakoshis et al., 2020, eLife).

Methods: EEG data recorded during eyes open and closed resting state conditions was analyzed in a sample of male children from data releases 1-10 of the Child Mind Institute Healthy Brain Network (CMI-HBN; age range: 5-21 years; autism n=310 ; typically-developing (TD) n=129). The Hurst exponent (H) was computed across 93 channels and input into stability-based relative clustering validation analysis (reval with k-means clustering; Landi et al., 2021, Patterns) to identify subtypes and estimate generalization accuracy. The SigClust library in R was used to test the null hypothesis that similar clusters could be obtained from a single multivariate Gaussian distribution. For each channel, linear mixed effect models were used to test the effects of subtype, age, and the subtype*age interaction. Principal component analysis (PCA) was also used to reduce the dimensionality of the dataset down to orthogonal latent variables and allow for inference about global versus more localized effects.

Results: Stability-based relative clustering validation revealed the presence of two autism subtypes with high generalization accuracy > 92% and which highly differ from a single multivariate Gaussian null distribution (p < 9.99e-5). Autism subtype 1 had higher H than the TD group (Cohen’s d > 0.24) and can be interpreted as having normatively lower E:I ratio. Conversely, autism subtype 2 had lower H (i.e., higher E:I ratio) compared to the TD group (Cohen’s d < -0.34). These effects were ubiquitous across all 93 channels (FDR q < 0.05). PC1 of a PCA analysis parsimoniously captures this global effect differentiating subtype and accounts for >71% of the variance in the data.

Conclusions: Two highly generalizable E:I-relevant autism subtypes can be identified in resting state EEG data, with opposing patterns of difference from the TD group. The subtypes reveal global differences in E:I imbalance, which could inform future studies examining global spatial effects with higher spatial resolution (e.g., resting state fMRI). These insights may be important when theorizing about how heterogeneous neurobiological mechanisms affect different types of individuals and also for testing the effects of pharmaceutical agents targeting E:I imbalance.
Background: The temporoparietal junction (TPJ) in the ventral attention system supports social cognition, particularly in the theory of mind (ToM). Nevertheless, how the social network interrelates with the salience network and functionally connects with the executive network in daily-life tasks is still poorly understood. Cognitively demanding goal-directed tasks are thought to involve the dynamic interplay of these large-scale neural networks. In previous work, we found that when performing a virtual shopping task matching the performance of controls, adolescents with autism spectrum disorder (ASD) hyperactivate three core networks: executive, saliency, and social cognition. This raises the question of how individuals with ASD recruit these networks when attempting to successfully perform real-life tasks, particularly, how connectivity between networks changes during information processing in complex navigation tasks.

Objectives: We aimed to study the functional connectivity between ToM, ventral attention, and executive function (EF) networks in ASD in realistic quotidian scenarios, while different types of social/non-social contexts are available.

Methods: Fifteen adolescents with ASD (14 male, 1 female; median age=16 years 4 months) and 14 chronologically age and Performance IQ-matched typically developing (TD) participants (12 male, 2 female, median age=15 years 2 months) performed the EcoSupermarketX (a shopping simulation task including three conditions: ‘no cue’, ‘non-social’ [arrows] or ‘social’ [avatars] cues), during neuroimaging. A psychophysiological interaction (PPI) analysis was performed with the left-TPJ as seed region to examine functional connectivity with other brain areas/networks. Comparative analyses were performed between groups for each of the three conditions.

Results: Using PPI analyses, we found group differences (random effects analysis, p<0.001) in the connectivity between left-TPJ and several other regions, particularly from the ventral attention network. The connectivity patterns varied depending on the condition. In the ‘no cue’ condition the PPI analysis revealed greater functional connectivity between left-TPJ and right-TPJ, right-insula, precenural gyrus, middle frontal gyrus, and visual association regions (middle occipital gyrus) in ASD than in TD. In the ‘non-social cue’ condition the PPI analysis revealed that in the ASD group the functional connectivity between left-TPJ and visual association regions (precuneus and lingual gyrus) was increased compared to TD. In the ‘social cue’ condition the PPI analysis revealed greater functional connectivity between left-TPJ and right fusiform and parahippocampal gyri, right posterior cingulate, middle and medial frontal gyri, and precuneus in ASD than in TD.

Conclusions: ASD adolescents in the absence of cues to perform goal-oriented ecological task, need to recruit more the ventral attention network, such as the insula, compared to TD. When there is a simple visual cue orienting the performance (non-social - arrows), the dominating part in the circuit is the connection TPJ-visual areas. In the social condition (social cue - avatars), there is a more complex pattern of hyperconnectivity of the TPJ to low- and high-level areas related to EF and action selection, in ASD comparing to TD individuals. Such distinct hyperconnectivity patterns of the TPJ in daily-life tasks and dependence on the type of cues (absent, simple visual or social cues) may provide a circuit level signature of neural diversity in ASD and provide a possible intervention target.

Background: Autism Spectrum Disorder (ASD) and Attention-Deficit/Hyperactivity Disorder (ADHD) are two commonly co-existing neurodevelopmental disorders with a lifetime prevalence rate of 40.2% (Rong et al., 2021) and often overlap in areas of functional impairments, such as academic performance, social relationships, and occupational outcomes (Antshel & Russo, 2019). At the trait level, approximately half of children with ASD show signs of ADHD symptoms. At the neurological level, ASD groups have been shown to demonstrate increases in the in error-processing measured by error-related negativity (ERN) in electroencephalography (EEG)/event-related potential (ERP) studies (Henderson et al., 2015) while ADHD groups have shown results of decreased ERNs compared to neurotypically developing children (Liao et al., 2018). However, despite their high comorbidity rates, no study to date has examined the co-occurring trait effects of each disorder on the ERN.

Objectives: The current study investigates whether co-occurring specific symptom clusters of ADHD (i.e., inattention and hyperactivity/impulsivity) mediates the relationship between autistic traits and mean ERN amplitudes in children with and without ASD.

Methods: Data collection for this study is completed and includes a total of 42 children (female=16) between the ages of 10-16 years old (M=15.2 years, SD=20 months) diagnosed with ASD (n=17) and without ASD (n=26) using gold-standard diagnostic methods, such as the
Background: Current diagnostic criteria for autism spectrum disorder (ASD) encompass impairments in two symptom domains: social-communication (SC) and repetitive and restrictive behaviours (RRB). Although often clinically presented together, there is evidence from molecular genetic, heritability and behavioural studies (1-3) that these two symptom domains are dissociable and may diverge onto different biological pathways.

Objectives: To investigate if social and non-social symptoms share the same neurobiological underpinning in autistic and neurotypical individuals. In a prior study, we found correlations between performance in SC tasks and availability of serotonin transporter (5-HTT), dimensionally in both the ASD group and control group (4). Here, we investigate if non-social traits also correlate with 5-HTT availability in the same sample.

Methods: Fifteen adult subjects (11 males/4 females) with ASD and normal IQ, and fifteen age, sex and IQ matched neurotypical subjects were examined with positron emission tomography (PET) and the radioligand [123I]CMA/43 binding to 5-HTT. To obtain a measure of RRB with sensitivity also for non-autistic control subjects, we used factor analysis to construct an index of RRB derived from subscales from three personality instruments: Temperament and Character Inventory (TCI), Revised NEO Personality Inventory (NEO-PI-R) and Swedish university Scales of Personality (SSP). Subscales were selected by a group of experienced clinicians based on content validity. The RRB index was validated against the RRB subscales in Social Responsiveness Scale (SRS) and Autism Spectrum Quotient (AQ). To tap further into the RRB domain, we measured cognitive flexibility with tests from the Delis-Kaplan Executive Function System (D-KEFS). In a subsample of six ASD and seven control subjects, sensory reactivity was assessed with the Sensory Reactivity in Autism Spectrum questionnaire.

Results: None of the RRB measures correlated with 5-HTT availability. In the smaller subsample, we found negative correlations between sensory reactivity and 5-HTT availability in several brain regions.

Conclusions: In contrast to SC, RRB measurements did not correlate with 5-HTT availability except for sensory symptoms in a smaller subsample. This indicates that 5-HTT is less important for RRB than for SC, and suggests that RRB and SC may diverge onto different neurobiological mechanisms. Sensory symptoms may differ biologically from the other non-social ASD criteria. Further studies of how different symptoms map onto the same or different neurobiological mechanisms are warranted to guide development of precision pharmacological treatments.

Background: Gain control refers to the modulation of neural responses based on context. Current approaches used to assess gain control in autism spectrum disorder (ASD) rely on participants to provide verbal responses of perception, or assessment of behavioral cues, and are necessarily subjective in nature. Given that gain control of sensory responses is altered in ASD, there is a need to identify objective and quantifiable measures of gain control that allow testing across ages, cognitive abilities, and in non-verbal populations.

Objectives: We developed an EEG-based measure of gain control in tactile processing, and evaluated the measure in relation to diagnosis of ASD or typical development (TD). We then studied the associations between the EEG measures and phenotypic measures of sensory processing.

Methods: In an ongoing pilot study, we have collected data from children aged 3-4 years with ASD (n=6) and TD controls (n=17), matched across groups for age and gender. Multichannel EEG was recorded while mechanical stimuli were presented. Stimuli consisted of vibrotactile stimulation delivered to one of three locations, chosen at random for each trial: index finger, middle finger, or both simultaneously. Gain control was evaluated through a spatial suppression index (SSI) determined by somatosensory evoked potential (SEP) amplitudes across paradigm conditions:

$$SSI = \frac{[SEP(\text{Index}) + SEP(\text{Middle}) - SEP(\text{Both})]}{[SEP(\text{Index}) + SEP(\text{Middle})]}$$

SSI of zero thus indicates no suppression (i.e., the response to stimulating both fingers equals the sum of the responses to stimulating either finger alone). Positive SSI indicates some suppression (which is expected due to lateral inhibitory mechanisms in neural circuits), whereas negative SSI indicates an unexpected facilitation of the response when both fingers are stimulated together.

Focusing on P50 and P100 SEPs over the left somatosensory cortex, we compared SSIs across groups using independent sample t-tests, and studied associations between SSIs and a parent report measure of sensory processing (Sensory Profile 2; SP2) using Pearson correlations.

Results: The SSI of the P50 is significantly lower in children with ASD, relative to TD ($p=0.02, d=1.02$), while the P100 SSI did not significantly differ between groups. The P50 SSI did not correlate significantly with SP2 seeking scores ($r=-0.36, p=0.15$), while the P100 SSI had a significant negative correlation with SP2 seeking scores ($r=-0.59, p=0.01$; see Figure 1).

Conclusions: EEG-based measures of gain control offer a promising avenue for biomarker development in ASD, because these objective and quantifiable measures can index underlying neural network function and have translational utility. Initial results suggest our EEG measures could capture distinct patterns of spatial suppression in ASD. As a group, participants with ASD show reduced spatial suppression, relative to TD, but our SSI measures capture a wide distribution of individual responses in ASD. This shows promise for capturing the heterogeneity of sensory phenotypes in ASD, which includes both hypo- and hyper-sensitivity. Further data will be collected to increase sample sizes in this study.

**409.047 (Poster) EEG Measures of Reduced Tactile Gain Control in ASD**

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Background: Attention-deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) are neurodevelopmental disorders that commonly co-occur and each lead to significant impairment in functioning which is amplified when both occur together. While traditionally the inattentive and hyperactive symptoms of ADHD are considered separately from the social communication and interaction impairments in ASD, social impairment has long been recognized as a common presentation in individuals with ADHD. Social impairments in ADHD often present the challenge of distinguishing between ADHD, ASD, or both disorders co-occurring (ASD+ADHD).

Developing a technique to assist with appropriate diagnosis will prevent delays in access to critical services and treatments that may alter the course of the disorders and minimize the level of impairment experienced by individuals due to delayed or missed diagnosis.

Objectives: Identifying potential biomarkers that are uniquely associated with ASD alone, ADHD alone, and ASD+ADHD, based on distinct EEG profiles of spectral power and coherence among cortical brain regions.

Methods: We analyzed EEG recordings (from the Child Mind Institute’s Healthy Brain Network) during resting eyes open (EO) and eyes closed (EC) conditions. Data were from 4 groups of boys (age range: 5-16 Yrs): (1) Typically Developing (TD, n=86), ADHD without clinical diagnosis of ADHD (n=33), ADHD without clinical diagnosis of ASD (n=112), and (4) co-occurring ASD +ADHD (n=103). Analysis consisted of computing (1) absolute and relative spectral power from 31 EEG channels covering frontal, central, temporal, parietal, and occipital sites of both hemispheres, and (2) pair-wise coherence (magnitude) among the EEG sites. Both spectral and
coherence analysis was performed over Delta (0.5-4 Hz), Theta (4-8 Hz), Alpha (8-12 Hz), Beta (12-30 Hz), and Gamma (30-50 Hz) frequency bands. The mean spectral power and coherences at each frequency band of the 4 groups were compared using ANOVA, and for the specific cases where p (adjusted for multiple comparisons) was < 0.05, pair-wise comparisons were performed among the 4 groups.

**Results:** There was no difference in spectral power of ASD compared to the other 3 groups during EO or EC conditions. The ADHD group had a higher power in the right frontal area at mid Beta range (16-20 Hz) compared to TD and ADHD+ASD groups. Magnitude of coherences showed significant differences among the four groups in the left hemisphere between frontal, central, temporal, and parietal/occipital areas. Specifically, during EC, the coherence between the left-temporal and left-parietal/occipital sites showed significant increase in ASD compared to TD, ADHD, and ASD+ADHD groups. EC coherences within the left temporal area at gamma band frequencies showed a significant decrease in ADHD+ASD compared with ADHD, ASD, and TD groups.

**Conclusions:** The results of this study suggest several potential biomarkers, based on the spectral power and coherence magnitude at specific frequency bands, for distinguishing TD, ASD, ADHD, and combined ADHD+ASD groups. Future work will include combining these candidate biomarkers, via classification and machine learning methods, to produce more sensitive-specific biomarkers for separating the groups.

409.049 **(Poster) Early Bilingualism and Autism: Charting the Relationship between Early Bilingualism and the Neural Basis of Social Cognition in Autism.**

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Background: Research reports a positive relationship between early bilingualism (acquisition of a 2nd language – L2 – before age 5) and the development of cognitive perspective taking in typical development, with associated neural differences, though research with adult populations is more inconsistent due to methodological discrepancies. While the social domain is particularly relevant in autism, with the development of autistic children’s sociocognitive skills following a different trajectory to that of their neurotypical peers, little research has investigated how the sociocognitive development of autistic people was shaped by bilingualism. Early findings suggest that this positive relationship between early bilingualism and the development of cognitive perspective taking also exists in autism, even when measured in an adult population, though not for affective perspective taking. What, then, are the neural basis of this relationship?

Objectives: This study describes the relationship between early bilingualism and the neuroactivity underlying cognitive perspective taking of autistic people compared to their neurotypical peers.

Methods: A sample of 17 autistic (with a clinical diagnosis, 53% female, mean age = 32.4 years, 9 early and 8 late bilinguals) and 15 neurotypical (67% female, mean age = 29.1 years, 8 early, 7 late) bilingual adults living in the U.K. took part in the study. Autistic and neurotypical participants only differed in their autism quotient score, and early and late bilinguals only differed in the age of acquisition of L2, with all other variables matching across groups (age, gender, non-verbal IQ as measured by the WASI-II, number of languages proficiently known and L2 overall proficiency as self-reported in a Language History Questionnaire). Participants completed a cartoon-based neuroimaging cognitive and affective perspective taking task to record their neuroactivity patterns during perspective taking. First-level whole-brain analysis identified the neural activity associated with each experimental condition of the task (cognitive, affective, control). Second-level analysis (repeated measures ANOVAs) explored the relationship between bilingualism groups and experimental conditions across the whole group. The influence of autism was assessed only on the regions showing a significant interaction between bilingualism groups and conditions with 2x2 ANOVAs across bilingualism groups and autism diagnosis.

Results: The neuroactivity linked with cognitive perspective taking differed between early and late bilinguals in the right anterior cingulate cortex (rACG). No relationship between bilingualism and affective perspective taking neuroactivity was found. In the rACG, for equal task performance (mean response time, accuracy), early bilinguals showed less activation than late bilinguals. There was no interaction between bilingualism group and autism diagnosis (Figure 1).

Conclusions: This study is the first to address the neurological profile of autistic bilinguals. The neurological findings support those at the cognitive level. Indeed, these findings suggest early bilingualism could influence the development of cognitive perspective taking in a long-lasting way in both autistic and neurotypical development, but not that of affective perspective taking. This deepens our understanding of the ability of the developing autistic mind to approach and respond to language learning, in terms of non-linguistic social processes. This contributes to an evidence base to support autistic people in their language learning journey.

409.050 **(Poster) Evaluating Peak Alpha Frequency As a Biomarker for Angelman Syndrome**

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Background: Angelman syndrome (AS) is a neurodevelopmental disorder caused by loss of expression of the maternal copy of the UBE3A gene. Phase 1 trials are currently underway in children using antisense oligonucleotides to unsilence the dormant paternal copy of UBE3A and re-express UBE3A protein in the brain. For these and other trials to succeed, there is a need to develop biomarkers that can objectively assess target engagement and/or treatment efficacy. Electroencephalography (EEG) is a safe and well-tolerated method to assess and quantify resting state brain rhythms in children with AS. Peak alpha frequency (PAF), defined as the frequency at which EEG oscillations are strongest within the alpha band, is a particularly valuable marker of neurodevelopmental trajectories. Our previous work demonstrated that in children with autism, PAF trajectories are abnormal and PAF is linked to non-verbal cognitive abilities.

Objectives: We seek to test the hypothesis that peak alpha frequency does not develop normally in individuals with AS and thus represents an EEG biomarker that may be well-suited for use in clinical trials.

Methods: We quantified PAF in EEGs from individuals with AS and age-matched neurotypical controls. Current preliminary analysis includes 30 AS EEGs gathered via the AS Natural History Study, which is a subset of the ~150 total EEGs available. We assessed and compared the developmental trajectory of PAF using linear regression.

Results: In this subset of EEGs, PAF did not follow the typical developmental trajectory in AS. In addition, PAF was more difficult to detect in AS EEGs compared to neurotypical EEGs. There were no clear differences in age or in other EEG properties between individuals where PAF was detected and individuals where PAF was not detected.

Conclusions: PAF has potential as an EEG biomarker for AS. Ongoing work seeks to expand the sample size and enable broader conclusions.

409.051 (Poster) Examining Frontal Alpha and Gamma Power in Young Children at Elevated Likelihood for Autism

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Background: Differences in brain development preceding autism arise before toddlerhood (Varcin & Jeste, 2017). Language development within the autistic population is highly variable, however it is unclear which brain factors underlie this heterogeneity. Prospective studies of children at elevated likelihood (EL) for autism can provide insight into underlying markers. Electroencephalography (EEG) studies in EL-children have shown that frontal power can be linked to language development (Wilkinson et al., 2019) and overall autism characteristics (Gabard-Durnam et al., 2019), though no clear markers have been postulated.

Objectives: This study investigated whether frontal EEG power at 10 and 14 months (M) is associated with language and autism characteristics in EL-children at 14 and 24M.

Methods: As part of a prospective longitudinal study, resting-state EEG was collected at 10M and 14M (N=55). Frontal power (electrodes F3, F7, F4 and F8 located according to the 10-20 system) in the alpha (6-13Hz) and gamma (30-50Hz) frequency bands was examined. Language outcome was assessed using the index scores of the Bayley Scales of Infant and Toddler Development at 10M, 14M and 24M. The Autism Diagnostic Observation Schedule (ADOS-2) was used to classify children in two groups (‘high’ and ‘low’ amount of characteristics) at 14M and 24M. Total raw scores were used to assess autism characteristics.

Results: Significant group differences in frontal power were found at 10M between groups when classified at 14M (U(N=39) = 78.00, z = -1.78, p = .039) but not at 24M (U(N=24) = 38.00, z = 0.4, p = .68). No group differences were observed in frontal alpha or gamma at 14M, nor in gamma at 10M. When looking at total ADOS-2 scores, correlations revealed a marginally significant negative association between frontal alpha at 10M and autism features at 14M (r = -.30, p = .05). All other correlations were non-significant. Secondly, associations between language scores at 10M, 14M and 24M and frontal power at 10M and 14M were assessed. Significant positive associations were found between language scores at 10M and frontal alpha at 10M (r = .45, p = .002). Language scores at 24M were associated with frontal alpha at 14M (r = .33, p = .049) and frontal gamma at 14M (r = .34, p = .040). No significant associations were found between language scores at 14M and frontal power at 10M or 14M. As this is an ongoing study, results based on a larger sample and additional analyses will be presented during the meeting.

Conclusions:

This study exploratively investigated the relationship between autism characteristics, language development and frontal power in EL-siblings. Reduced frontal alpha, but not gamma, at 10M was associated with increased autism characteristics at 14M. Furthermore, increased frontal gamma and alpha power at 14M were associated with better language at 24M. Additionally, increased frontal alpha at
Explorable Autism Spectrum Disorder Models from EEG, Clinical and Cognitive Data for Mechanism Discovery and Targeting

**Background:** The various underlying genetic, cellular and environmental factors that make up the individual with Autism Spectrum Disorder (ASD) ensure the futility of one-size-fits-all approaches. One of several targetable mechanisms in ASD is presumably the imbalance in synaptic excitation-inhibition (E/I), specific to ASD and related disorders. Bumetanide, a mechanism-based treatment, successfully reinstated E/I balance, as depicted by electroencephalographic (EEG) signals in an R.C.T. (n=88)\(^2\), but only with partial translation into behavioral improvement\(^1\). A step towards a better mechanism targeting is the consideration of E/I balance within the broader picture of individual characteristics i.e. clinical severity, cognition or presence of EEG abnormalities. For example, we showed that individual severity, together with brain signal characteristics such as E/I balance and power in central(-parietal) regions, effectively predicted behavioral improvement in hold-out patient samples\(^1\). Also, we showed that EEG abnormalities and cognitive deficiencies are more specific to “inhibition-dominated” brain modes, than to ASD itself as defined behaviorally.

**Objectives:** These findings call for stratified-to-individualized approaches to treatment recommendations which are anchored in neurophysiological findings, alongside evaluation and refinement of treatment targets beyond behavioural domains. By incorporating clinical and cognitive measures, we refine mechanistic ASD models based on E/I balance to achieve a comprehensive picture of the disorder.

**Methods:** Behavioral and cognitive assessments were performed in a subset of n=57 ASD R.C.T. participants aged 7-15 years: 23 controls and 34 treated with bumetanide. In addition, brain signal characteristics such as E/I balance and power were computed from resting-state EEGs measurements\(^3\). Three dimensions: brain signals, cognition, behaviour and their dependencies were combined into a systemic approach called a structural equation model. This systemic approach allowed, in line with DSM-V behavioral dependencies, modelling multi-dimensional outcomes and incorporating proxy outcomes such as caregiver assessments. Goodness-of-fit measures were assessed to choose the best-fitting structural models.

**Results:** We found significant associations within dimensions, i.e., between behavioral improvement and caregiver assessments, and across dimensions, i.e., between brain signals and cognition, which served to define model dependencies. The final models revealed a comparable bearing of individual brain signals and cognitive variation on (social) behavioral improvement. Incorporating caregiver assessments led to comparable goodness-of-fit measures, supporting the consideration of such assessments as proxy measures. In line with previous behavioral improvement prediction results\(^4\), clinical severity was confirmed as the strongest predictor, brain signal characteristics coming second. Treatment group analyses suggest moderation, by virtue of cognition and brain signal characteristics, of the mechanism-based treatment effect on core behaviour.

**Conclusions:** These structural models bridge various dimensions from network brain dynamics to behaviour towards an explainable ASD. First, the explainability and biological anchoring of these models may prove helpful where, in the absence of a measure, a clinical decision requires proxies. Second, they may be used to predict, in addition to explain. Their effectiveness over predictive “black box” models prioritizing accuracy over explainability, is to be subsequently validated. Third, these models aim to better inform mechanisms and refine pharmacological targets. We are currently further investigating how individual characteristics influence the action of treatments hypothesized to reinstate E/I balance.

Exploring the Geometry Aware Resting State Neural Signature of Cognitive Empathy in Autism

**Background:** Autism differences in behavioral indices of cognitive empathy like emotion recognition (ER) accuracy and theory of mind are consistently reproduced across studies. Much of what we know about a possible core empathy network comes from functional MRI studies that interrogate empathy using performance-based tasks. Task-based functional connectivity captures state rather than trait capacities and makes it difficult to ascertain what findings are generalizable to everyday life and what is confined to the controlled nature of the lab.
Family and Age-Related Brain Functional Connectivity Patterns in Children with Autism Spectrum Condition and Their Siblings

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Background: Increased brain functional connectivity has been reported in children with Autism Spectrum Condition (ASC) compared with their healthy peers (1). In contrast, adults with ASC usually exhibit reduced brain functional connectivity (2). An altered neurodevelopment has been hypothesized to explain this switch in brain functioning during adolescence (3). Furthermore, family history of ASC has been related with this dysmaturation in newborn infants (4), showing an intermediate functional connectivity in adolescents relative to controls and their siblings with ASD5 in the Default Mode Network.

Objectives: We aim to evaluate group and age-related resting-state functional connectivity within several brain networks in children and adolescents with ASC compared to their siblings without ASC and neurotypic controls.

Methods: This is a case-control cross-sectional study including 45 autistic children and adolescents without intellectual disability, 20 of their siblings without ASC and 73 neurotypical controls (including 23 sibling-pairs). An eight-minutes eyes-closed resting-state functional MRI scan was acquired in a 3T scanner. Nineteen participants were excluded from further neuroimaging analyses due to excessive motion (8 ASD, 3 siblings, 8 controls). Independent component analysis was performed to identify the spatial maps of twenty brain functional networks. The spatial maps of each component for each subject were compared in a whole brain analysis using a multilevel mixed-effects linear regression model introducing group, age, group by age interaction and sex as fixed effects, and including family factor as random effect.

Results: There were significant group differences in the functional connectivity among groups: autistic children and adolescents exhibited diminished functional connectivity in parietal sensorimotor areas within the cerebellar network relative to the neurotypic controls (p < .04); and also diminished functional connectivity in areas associated to the sensory-motor network relative to their siblings (p < .02). There were no significant group by age differences in the functional connectivity among groups.

Conclusions: Our findings point to shared and differential brain functional connectivity patterns in children and adolescents with family-risk of ASC compared to their siblings with ASC; with potential as brain-based marker for identifying and monitoring ASC traits and setting. Resting state functional connectivity (rs-FC) methods offer a task-independent alternative for capturing intrinsic networks of functional brain organization that are more stable and allow for a more generalized characterization of brain function.

Objectives: The first objective was to replicate previous task-based findings of group differences across the network of regions involved in cognitive empathy using resting state data. The second, exploratory objective was to gauge the behavioral relevance of rs-FC between component pairs of regions within this network.

Methods: Our sample included 37 ASD (27 males, ages 8-35) and 39 neurotypical controls (26 males, ages 8-34), matched in age, sex, and full-scale IQ. We used the non-parametric multivariate distance matrix regression (MDMR) method to test the relationship between group and the similarity in patterns of rs-FC among regions that are relevant for cognitive empathy. Our MDMR distance metric was the geodesic distance that accounts for the intrinsic positive semi-definite cone geometry of neural functional connectivity. We used multiple linear regressions in our exploratory aim to identify potentially important interactions between specific pairwise relationships and diagnostic group for predicting ER accuracy. ER was assessed as the percentage of correctly labeled emotions when looking at emotionally charged images.

Results: Using a combination of rs-FC and a geometry-aware metric of similarity, the geodesic distance, we found that the connectivity among regions important for cognitive empathy are more similar for individuals within the same diagnostic group than between diagnostic groups (Fp = 0.017, p = 0.024). Our exploratory analysis for identifying neural correlates of ER in autism point to two potentially important pairwise relationships: connectivity between 1) the basolateral amygdala with the posterior temporoparietal junction and 2) the basolateral amygdala with the right inferior frontal gyrus.

Conclusions: Our MDMR finding is in line with previous studies that report autism specific connectivity patterns among empathy relevant brain regions. The presence of a task-independent connectivity profile in empathy regions that is more similar among autistics suggests a promising avenue for further elucidating autism specific connectivity using resting state methods with low cognitive demands. Our exploratory findings suggest that our autistic participants engaged a different neural strategy for ER that relies more on emotional-cognitive coupling than our neurotypical controls. A positive relationship between ER accuracy and the BLA connectivity with self-referential social cognitive regions like the pTPJ and rIFG in autism would suggest that autistic individuals access their own emotional states to better understand emotions in others.
diagnosis. Longitudinal studies are required to properly evaluate age-trajectories in children and adolescents with family-risk of ASC; and their correlates with functioning.

**409.055 (Poster) Finding a Perfect Match: An ERP Study Comparing Age and IQ Matching**

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**Background:** The Developmental Approach emphasizes parsing apart cognitive and developmental factors towards better understanding autism and other neurodevelopmental disabilities. Methodologically, this means matching groups on age and IQ so that results are not confounded by developmental factors. This approach has yet to be consistently implemented in neuroscience studies, as most assume that early neural measures are not influenced by cognitive processes. Here, we take a step towards demonstrating the role of IQ in early neurophysiological responses by examining the influence of age and performance IQ on Event-Related Potentials (ERPs).

**Objectives:** Given the importance of understanding how latent group characteristics impact neurophysiology, the primary aims of this project are to assess differences in the P1 and mismatch negativity (MMN) within groups of autistic and typically developing (TD) children when matched on age alone and performance IQ alone.

**Methods:** The P1 and MMN were compared across 2 sets of autistic and TD children. The first group was matched on chronological age (\(t(1, 20) = -0.310, p = .760\)) and the second was matched on the Perceptual Reasoning Index (PRI) of the Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II; \((t(1, 20) = 0.187, p = .853)\). The ERPs were elicited using an auditory oddball paradigm, consisting of alternating standard 1200Hz (80%) and deviant 1000Hz (20%) tones. The 50% fractional peak latency and mean amplitude were extracted from a frontocentral electrode cluster (E5, E6, E7, E12, and E106). Preliminary data below are based on 11 participants per group, with recruitment ongoing.

**Results:** When matched on age only, autistic and TD children (mean age = 12; mean PRI = 109) did not differ on the P1 fractional peak latency (\((t(1, 20) = -0.934, p = .361)\). However, when matched on PRI only (mean age = 13, mean PRI = 107) there were no differences in P1 fractional peak latency (\((t(1, 20) = -0.879, p = .390)\), but autistic children had significantly larger mean P1 amplitudes compared to their TD peers (\((t(1, 20) = -2.029, p = .056)\). For the MMN, there were similarly no differences between group on the MMN fractional peak latency (\((t(1, 20) = 0.309, p = .761)\) nor mean amplitude (\((t(1, 20) = 1.118, p = .277)\) when groups were matched on age. When matched on PRI, groups did not differ on fractional peak latency (\((t(1, 20) = 0.035, p = .972)\) but the autistic group had marginally larger mean MMN amplitudes (\((t(1, 203.153) = 1.904, p = .079)\).

**Conclusions:** Autistic children had larger P1 and MMN mean amplitudes when matched on PRI and no observed differences when matched on age. This demonstrates how methodological decisions regarding group composition influence subsequent results and conclusions, even in neurophysiological research. Thus, researchers should carefully consider developmental approaches (i.e., matching strategies) in neuroscience research with autistic individuals.

**409.056 (Poster) Unlocking Social Brain Function in Autism: Variation By Sex and Neurotype of Microdynamics of Face Processing**


**Background:** Accumulating evidence has started to define the autistic female phenotype, including higher social attention than males, that may contribute to late- and mis-diagnosis. Moreover, in our recent study, autistic and non-autistic females differed in the distributions of
Objectives: To investigate whether sex/neurotype influence the onset, duration, and order of configural processing, we tested the significance of interactions between these factors and the event-related response to upright/inverted faces across time, grouped adjacent time-bins into time-clusters, and examined differences of potential within.

Methods: Analyses involved 764 participants of the Longitudinal European Autism Project (204 non-autistic - average age 17.99 (SD = 5.62) years, average FSIQ 101.29 (19.23) - and 330 autistic males - 17.04 (SD = 5.32) years, FSIQ 96.25 (19.60); 107 non-autistic - 16.53 (5.68) years, FSIQ 103.21 (19.29) - and 123 autistic females - 16.95 (6.19) years, FSIQ 93.50 (19.11)), who watched 500-ms-long upright and inverted static photographs of faces (292 * 375 px), 168 times in 4 blocks (4.5 minutes), while EEG (10-20 64 channels with 120/300 Hz) was recorded. The data passed time delay correction (average 32.27 ms, SD = 20.22), bandpass and DFT-based filtering (0.1-40 and 50 Hz), resampling (500 Hz), EOG-cleaning and iterative interpolation, resulting in a final sample of 492 participants (65%). To obtain the time-clusters, we entered the pre-processed amplitude at P8 (aggregated to 10 ms time-bins) in 2 bootstrapped permutations as a function of a mixed model assuming stimulus (upright/inverted) as fixed and random intercept and slope, in interaction with fixed effects of (1) sex (male/female) and (2) group (autistic/non-autistic).

Results: We found 2 partially overlapping time-clusters (Figure 1). A significant stimulus by group interaction defined the earlier time-cluster (170-440 ms). Within this cluster, difference between upright/inverted was bigger in autistic (d = -0.54, SE = 0.24, p-value = 0.02), than non-autistic (d = 0.47, SE = 0.20, p-value = 0.02), and females than males (d = 0.76, SE = 0.26, p-value = 0.004) - however the stimulus-by-group and stimulus-by-sex interactions did not interact with each other.

A significant sex by condition interaction defined the later time-cluster (250-550 ms). Within it, difference between upright/inverted was bigger in males (d = -1.66, SE = 0.33, p-value <0.001) than females (d = 0.87, SE = 0.21, p-value <0.001); with age, stimuli difference became bigger (d = 0.11, SE = 0.01, p-value <0.001), irrespective of sex.

Conclusions: Configural processing varied by sex and group, with earlier main effect of group, and later main effects of sex. Sex differences in the earlier cluster might be due to partial overlap or feedback effect. These observations suggest that mean sex differences may be prominent later in the waveform as a potential constraint or moderator across groups. The amplitude difference in females may represent stronger perceptual amplification linked to different expressions of behaviour, such as visual social attention.

409.057 (Poster) Frequency-Tagging EEG Reveals Similar Neural Sensitivity in Men with and without Autism to Subtle Differences in Facial Identities and Expressions


Background: The fluent processing of facial cues (e.g. identities and expressions), which is vital for successful social interactions, might be challenging for individuals with autism spectrum disorder (ASD).

Objectives: Considering the mixed behavioral results on facial identity and expression processing in ASD, we wanted to overcome influences of compensatory strategies. Therefore, in the present study, we applied frequency-tagging EEG to assess the automatic and implicit neural sensitivity of adults with and without ASD to subtle facial cues.

Methods: We examined the neural sensitivity of 23 adult men with ASD and 23 neurotypical controls (matched on age, sex and IQ) to rapidly and implicitly detect subtle changes in facial identities and expressions, using frequency-tagging EEG. In oddball paradigms, base rate images were presented at 6 Hz, periodically interleaved every fifth image with an oddball image (i.e. 1.2 Hz oddball frequency). To examine the neural sensitivity to facial identities, base rate images were the neutral face of one individual; oddball images were neutral faces of different individuals. These stimuli were presented either upright or inverted, to also gain more insight in the automatic perceptual strategy used to process faces. To investigate the neural sensitivity to facial expressions, base rate images of neutral faces with different identities were periodically interleaved with an expressive face (angry, fearful, happy, and sad, in separate sequences). These distinctive frequency tags for base rate and oddball stimuli allowed direct and objective quantification of the neural identity-discrimination or expression-categorization responses.

Results: We found no differences in the neural sensitivity of participants with and without ASD, neither when discriminating between facial identities, nor when detecting different facial expressions. Both groups also showed a similar face-inversion effect, with reduced neural responses for inverted versus upright faces. When processing facial expressions, sad faces elicited significantly lower brain responses than angry, fearful and happy faces in both groups. Looking at the topographical distribution of the neural activity revealed that identity-discrimination responses were mostly recorded over the right occipito-temporal region for both adults with and without ASD. The
control group also displayed these higher-level right occipito-temporal response peaks when detecting differences in facial expressions, yet, for men with ASD, responses were higher in the medial-occipital region.

Conclusions: We applied frequency-tagging EEG to investigate the neural sensitivity of adult men with and without ASD to facial identities and expressions. Our results indicate that participants in both groups are equally capable to rapidly and implicitly detect differences in identity and emotional expression. Additionally, for both participants with and without ASD (i) the holistic processing of facial identities gets disrupted when faces are presented upside-down, as evidenced by the face-inversion effect, and (ii) distinguishing sadness from neutrality in the blink of an eye seems to be harder than any of the other emotions. The right hemisphere advantage reflects the larger involvement of higher-level visual areas. However, for the rapid changes in facial expressions, men with ASD might rely more on a feature-based approach, as the activity in the medial-occipital region suggests the dominance of low-level visual processing.

409.058 (Poster) Functional Brain Network Alterations during Early Childhood in ASD


Background:

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition defined by difficulties in social communication and restricted/repetitive interests and behaviour that can vary along a continuum of severity. Growing consensus suggests that individuals with ASD exhibit abnormal functional connectivity, resulting in alterations of large-scale brain networks. From a clinical perspective, the demand is thus high for non-invasive and easy to-use tools to identify early pathological alterations in brain networks.

Objectives:

The goal of the study was to characterise early alterations of functional brain connectivity in young children with ASD, as well as their developmental trajectory.

Methods:

We explored differences in functional brain network topology using resting-state EEG in 40 young children with ASD compared with 73 typically developing children, aged 2-8 years. We used a framework for advanced EEG analysis called 'EEG source connectivity method' combined with graph theory-based analyses. The functional networks were reconstructed at the cortical level from scalp EEG electrodes. The identified networks were then analysed by graph measures that allow their characterisation at different scales from node- and edge-wise topology to global-wise analysis (Figure 1).

Results:

Our results revealed alterations in functional brain connectivity between the two groups in the alpha band. Children with ASD exhibited a higher edge-wise global connectivity index than typically developing children already at 2 years of age. Node-wise analysis showed a local overconnectivity in ASD children with mainly frontotemporal and latero-occipital alterations.

Conclusions:

These results shed light on the abnormal network topology in ASD children, which may indicate some loss of neighbourhood architecture to a random network. Future work is needed to determine how these alterations contribute to the emergence of cognitive and behavioural symptoms observed in young children diagnosed with autism or other neurodegenerative disorders.

409.059 (Poster) Functional Connectivity between the Visual and Salience Networks Reflects Individual Variation in Social Behavior in a School-Age Sample Enriched for Autism Spectrum Disorder

Methods: Data were analyzed from 12- and 24-month-old infants in the multisite Infant Brain Imaging Study (IBIS), a prospective study of ROIs contributing to network enrichment based on published literature.

Objectives: (a) To test whether correlations between social motivation and ROI-ROI functional connectivity (fc) are enriched within specific brain networks. (b) To characterize the directionality of implicated fc-behavioral associations, as well as behavioral associations of brain-behavior relationships for social motivation during the first two years of life, when core autistic symptoms arise, may therefore elucidate neural systems contributing to the development of ASD.

Results: ROI pairs within the visual and salience networks (Vis-Sal fc) were significantly associated with social affect symptoms (SA) at school-age (p = 0.00002; Figure 1B). Though none of the individual ROI-pair associations reached experiment-wide significance, 97% of the 333 ROI pairs in Vis-Sal were positively associated with SA (expected 50% under the null). No other behaviors were significantly associated with Vis-Sal connectivity (all enrichment p > 0.20), or with connectivity in other network pairs. Average connectivity for the Vis-Sal pair was significantly correlated with SA scores (partial r: 0.36, 95% CI: 0.17-0.52, p < 0.001). The association remained highly significant after accounting for all other behaviors, sex, and age (96 = 3.72, p = 0.0003).

Conclusions: Functional connectivity between the visual and salience networks is associated with individual variation in social affect symptomology in a sample enriched for ASD. Visual-salience connectivity may represent both a neuroimaging marker of risk (stronger connectivity, greater clinical impairment) and resilience (weaker connectivity, less impairment) that deserves further study. Given recent evidence from our group linking genetic liability for ASD to the development of the visual system during infancy, these results also suggest that visual and sensory network development may play a role in the emergence of autistic social traits. Future work in our sample will seek to chart the development of visual network structural and functional connectivity during the period leading up to a diagnosis of ASD.

Background: Autism spectrum disorder (ASD) is a highly heritable and clinically heterogeneous developmental disorder affecting 1-2% of the population. Phenotypic variability among individuals with ASD is a key challenge in developing effective interventions to improve quality of life. Neuroimaging markers that reflect individual variation in behavior will be critical to parsing heterogeneity, understanding the neurobiology of ASD, and designing personalized intervention targets.

Objectives: To identify functional brain networks associated with ASD-relevant behaviors including variations in symptomology, comorbidities, and developmental functioning.

Methods: Resting state functional connectivity (fc) MRIs were collected from 121 school-age children (7.5-11.6y, 55 male) from the longitudinal Infant Brain Imaging Study. Children were recruited as infants with a family history of ASD (n = 78) or controls (n = 43); 20 children (13 male) received an ASD diagnosis during the study. We used multiple regression to screen for associations between fc of ~40k region of interest (ROI) pairs (285 ROIs assigned to 12 networks) and six behavioral variables:ADOS (1) social affect and (2) restricted and repetitive behavior calibrated scores; and standardized measures of (3) generalized anxiety, (4) inattention, (5) motor coordination, and (6) matrix reasoning. Analyses controlled for study site, sex, and age. We identified clusters of brain-behavior associations within and between functional networks (empirical p-values via rotation tests). Partial correlations and regression were used to characterize the association between average connectivity in a network pair and individual behaviors.

Results: ROI pairs within the visual and salience networks (Vis-Sal fc) were significantly associated with social affect symptoms (SA) at school-age (p = 0.00002; Figure 1B). Though none of the individual ROI-pair associations reached experiment-wide significance, 97% of the 333 ROI pairs in Vis-Sal were positively associated with SA (expected 50% under the null). No other behaviors were significantly associated with Vis-Sal connectivity (all enrichment p > 0.20), or with connectivity in other network pairs. Average connectivity for the Vis-Sal pair was significantly correlated with SA scores (partial r: 0.36, 95% CI: 0.17-0.52, p < 0.001). The association remained highly significant after accounting for all other behaviors, sex, and age (96 = 3.72, p = 0.0003).

Conclusions: Functional connectivity between the visual and salience networks is associated with individual variation in social affect symptomology in a sample enriched for ASD. Visual-salience connectivity may represent both a neuroimaging marker of risk (stronger connectivity, greater clinical impairment) and resilience (weaker connectivity, less impairment) that deserves further study. Given recent evidence from our group linking genetic liability for ASD to the development of the visual system during infancy, these results also suggest that visual and sensory network development may play a role in the emergence of autistic social traits. Future work in our sample will seek to chart the development of visual network structural and functional connectivity during the period leading up to a diagnosis of ASD.

Background: Early deficits in social motivation have been hypothesized to constrain social learning, thereby leading to atypical development of social communication and autism spectrum disorder (ASD). Recent work found that social motivation differs by level of familial ASD liability in infancy (Marrus et al., 2022), suggesting it may serve as an early marker of heritable ASD factors. Characterizing brain-behavior relationships for social motivation during the first two years of life, when core autistic symptoms arise, may therefore elucidate neural systems contributing to the development of ASD.

Objectives: (a) To test whether correlations between social motivation and ROI-ROI functional connectivity (fc) are enriched within specific brain networks. (b) To characterize the directionality of implicated fc-behavioral associations, as well as behavioral associations of ROIs contributing to network enrichment based on published literature.

Methods: Data were analyzed from 12- and 24-month-old infants in the multisite Infant Brain Imaging Study (IBIS), a prospective study of infants at high (HL) and low familial likelihood (LL) of an ASD diagnosis. Participants had concurrent functional neuroimaging and...
behavioral data at 12 (n=92; HL/ASD/HL/noASD/LL/noASD=8/58/26) and/or 24 months (n=97; HL/ASD/HL/noASD/LL/noASD=15/63/19). A clinical best estimate ASD diagnosis was assigned at 24 months. A social motivation composite with strong face validity for social motivation (Marrus et al., 2022) was generated using items from multiple parent-report measures in the IBIS battery. Resting state functional MRI data were collected during natural sleep using gradient-echo echo-planar image acquisition on cross-site calibrated 3T Siemens TIM Trio scanners. Analyzed subjects had at least two 6.25-minute runs and 150 frames of motion-scrubbed data. Two hundred thirty functionally-defined ROIs were sorted into networks using the Infomap community detection algorithm (Rosvall and Bergstrom, 2008) on 12- and 24-month data (Figure 1A). Enrichment analysis identified networks and pairs of networks whose fc strongly correlated with behavior, (p<.001 considered significant), followed by a machine learning procedure for secondary validation (Hawks et al., 2021). ROIs whose connections frequently contributed to enrichment were examined in the Neurosynth database (Yarkoni et al., 2011) for behavioral associations in older subjects based on posterior probabilities aggregated from scientific literature.

Results: At 12 months, the anterior frontoparietal control-1–somatomotor-2 (aFPC-SMN2) network pair showed significant enrichment (p=.0002), whereby contributory ROI pairs exhibited a negative association with social motivation across a range of positive and negative fc values. (Figure 1B). This finding did not pass secondary validation. At 24 months, the posterior FPC–anterior default mode network-2 (pFPC-aDMN2) network pair showed significant enrichment (p=.0006) and passed secondary validation. This network pair displayed an overall positive association with social motivation across a range of positive and negative fc values. Neurosynth terms strongly associated with ROIs in both the pFPC and aDMN2 encompassed aspects of social and general cognition.

Conclusions: The most strongly implicated networks associated with early social motivation included task control networks (i.e., FPC) and the DMN, for which differences have been observed at later stages in ASD. Future directions include investigating whether these early brain-behavioral relationships correlate with long-term outcomes of IBIS infants through school age and adolescence.

409.061 (Poster) Global Motion Processing in Infants' Visual Cortex and the Emergence of Autism
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Background: Differences in basic perceptual processes have been documented in autistic children and adults. Specifically, studies have suggested a link between autism and altered processing of global visual motion. Yet, it is unknown whether distinctive patterns of global motion processing in infancy precede the onset of autism symptoms.

Objectives: We aimed to understand the patterns of visual cortex (VC) activation during the basic visual processing of local form, local motion, global form, and global motion, and to test any difference in these patterns between samples of infants at elevated likelihood & low likelihood of autism, and a large general sample of infants. We also sought to see if differences in these basic visual processes during infancy are predictive of later autistic symptoms during toddlerhood.

Methods:

Using electroencephalography, we assessed basic visual processing in 525 (265 male, 260 female) 5-month-old infants from two different study cohorts: EASE (Early Autism in Sweden) and BATSS (BabyTwins Study in Sweden). Fifty-two infants were at elevated likelihood (EL) and 21 infants were at low likelihood for autism (LL) in EASE, and 452 infants (not screened for autism) were twins (242 monozygotic and 210 same sex dizygotic) in BATSS.

Visual stimuli. We employed 4 types of stimuli to evoke global form, global motion, local form, and local motion processing on EEG. EEG measurement was taken at 5 months for all infants

Behavioral assessment. To measure later autistic traits in EASE sample, we used ADOS-2 (Autism Diagnostic Observation Schedule v2) CSS scores taken at 36 months. As comparable measures for BATSS sample, we used ITC (Infant Toddler Checklist) and Q-CHAT (Quantitative Checklist for Autism in Toddlers) taken at 18 and 24 months, respectively.

Twin modelling. To assess genetic and environmental influences on individual variability in these basic visual processes, we employed the ACE/ADE models on BATSS sample only.

Results: (See attached figure) Visual cortex activation profiles during global form, global motion, local form, and local motion processing were first established for 473 infants not at elevated likelihood for autism (EASE LL + BATSS). Compared to this sample, global motion topographic profiles were different (enhanced lateral and reduced midline VC activation; p < .001) in infants who later exhibited autistic symptoms at clinically significant levels (c; bottom panel). Among EASE infants, a higher lateral-relative-to-midline activation only during global visual motion processing was associated with higher levels of autistic symptoms in toddlerhood (r = .465, p < .001) (a & b;
upper panels). Finally, we found that individual differences in these global motion profiles heritable (95%-CI: .047 – .392) in BATSS infants.

Conclusions: Using EEG, we demonstrated in the sample of EL infants that a different topographical VC organization of global motion processing is positively associated with autistic symptoms in toddlerhood. In particular, EL infants with later severe autistic symptoms were shown to have enhanced lateral but reduced midline VC activation. Based on the infant twin sample, we showed that individual differences in this topographical activation during global motion processing partly reflect genetic variation in the broader infant population.

409.062 (Poster) Glutathione Metabolism Imbalance Related to Autism Quotient Pattern in Adults: Advances in Diagnosis
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Background: Autism spectrum disorder (ASD) is a neurodevelopmental disorder whose precise etiology seems to be as heterogeneous as its severity levels. Nevertheless, accumulating evidence suggests that oxidative stress could be a common feature in autism, which may be further exacerbated by inflammatory phenomena, immune deregulation, and certain autoimmune risk factors, that may also contribute to the development and pathogenesis of autism. Following our research line linked to the tripeptide glutathione (GSH) as a key mechanism underlying symptoms of ASD, the hypothesis of GSH metabolism imbalance correlates with impairments on the domains of autism quotient (AQ).

Objectives: To study the correlation of glutathione (one of the major antioxidants) to the Autism Quotient (AQ) domains for adults using 1H-MRS in vivo.

Methods: We quantified glutathione reduced (GSH), creatine (Cr), and N-acetyl aspartate (NAA) signal in anterior (ACC) och posterior (PCC) cingulated cortices separately by magnetic resonance spectroscopy (MRS) on a 3.0 Tesla MR scanner, to assessed 22 adult patients with ASD and compared with 44 healthy subjects, matched for age, gender. AQ test were applied where the subgroup algorithm, which combines the scores on the five AQ domains (social skills, attention switching/tolerance to change, attention to detail, communication, and imagination) derived the cutoff threshold to yield reliable autism subgroups as following: AQ1 (0–10 points) = below average; AQ2 (11–21 points) = average values of the normal population; AQ3 (22–31 points) = above average; AQ4 (32–50points) = very high index of autistic characteristics. The Autism Quotient had an average score of 35. Statistic one-way ANOVA was applied. Pearson’s correlation hallmarks our goal.

Results: The Pearson correlation coefficient represented graphically, showed a positive significant correlation between AQ domain ‘Communication’ to GSH (r = 0.51, p = 0.01); to GSH/Cr ratio (r = 0.51, p = 0.01); and GSH/NAA ratio (r = 0.56, p = 0.004) in AQ2 group (see Fig.1; Fig.2); in AQ3 to GSH negative significant correlation (r = -0.69, p = 0.05) in the PCC. Contrary in AQ4 to GSH/NAA positive significant correlation (r = 0.54, p = 0.05) in ACC.

Notably, in AQ1 group is a significant negative correlation between GSH/Cr ratio to ‘Attention switching/tolerance to change’ domain (r = -0.57, p = 0.03); and significative positive correlation between GSH/NAA ratio to ‘Attention to details’ domain (r = 0.52, p = 0.05) in PCC; indicating the intervention of creatine, responsible of cell damage caused by lack of oxygen and protector by preventing the depletion of energy ATP, and N-Acetyl aspartate (marker of density neuronal). AQ2, AQ3, and AQ4 groups maintain a pattern correlation to AQ domains different than the AQ1 group (considered group of healthy subjects) and highlight the differences in the autistic characteristics within ASD, and as hallmark of the ‘Communication’ deficit (Bjorklund, G., 2021).

Conclusions: The opportunity to measure the concentration of GSH in cingulated cortices creates a new and promising approach for intensified diagnosis and the effects of a new venue clinical trial in ASD.

409.063 (Poster) Hemispheric Specialization for Lateralized Networks in Autistic and Neurotypical Individuals
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Background: One well-replicated finding is that of reduced cerebral lateralization in autistic individuals during speech and language (Eyler et al., 2012; Herbert et al., 2022; Harringshaw et al., 2016; Kleinhans et al., 2008; Knaus et al., 2008, 2010). However, it is unknown if these disruptions in hemispheric lateralization in autism are localized to language-relevant regions (McCann, 1982), or if they are more pervasive. Current evidence is mixed, with findings for generally increased activity in the right hemisphere in autism (Anderson et al., 2010; Knaus et al., 2008; Takeuchi et al., 2004; Tesink et al., 2009; A. T. Wang et al., 2006), generally decreased activity in the left hemisphere (Eyler et al., 2012; Harris et al., 2006; Müller et al., 2003), and both increased activity in the right hemisphere and decreased activity in the left hemisphere (Boddaert et al., 2003; Kleinhans et al., 2008; Redcay & Courchesne, 2008).
Methods: The hypothesis was tested with a cross-sectional dataset composed of 109 autistic and 78 typically developing individuals ages 5-21 years. Functional MRI neuroimaging analyses were performed using the CBIG2016 preprocessing pipeline (Kong et al., 2019; Li et al., 2019) and the Kong2019 multi-session hierarchical Bayesian modeling parcellation pipeline (Kong et al., 2019). Hemispheric specialization was estimated using the autonomy index on a vertex-by-vertex basis (Wang et al., 2014), which was then averaged within each of six previously identified lateralized networks: Temporal Parietal, Control A, Default A, Dorsal Attention A, Salience A, and Control B. A series of ANCOVAs were used to examine the relationship between network-averaged hemispheric specialization and diagnostic group, mean-centered age, mean-centered age squared, site, number of available volumes per task, and average framewise displacement in R version 4.2.0 using the package car.

Results: The slopes of network-averaged specialization were similar for the autistic and neurotypical groups for each of the six lateralized networks examined (Temporal Parietal: \( F(1, 177) = 1.69, p = 0.19 \); Control A: \( F(1, 177) = 0.74, p = 0.39 \); Default A: \( F(1, 177) = 1.71, p = 0.19 \); Dorsal Attention A: \( F(1, 177) = 0.41, p = 0.52 \); Salience A: \( F(1, 177) = 2.67, p = 0.1 \); and Control B: \( F(1, 177) = 0.24, p = 0.62 \). Additionally, no significant differences between the autistic and neurotypical groups were observed for each of the six networks after recentering age at 5, 10, 15, and 20 years.

Conclusions: In contrast to our hypothesis and previous reports of decreased lateralization in autistic individuals, we found no group differences in network-averaged specialization between 5-21 years. When considered in combination with previous reports, our results suggest that the selected networks are lateralized prior to age five and maintain this level of lateralization throughout later childhood and adolescence.

409.064 (Poster) Hypo Brain Activity in Response to Affective Touch in Autistic Children

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Background:

Affective touch, triggered by gently touch, plays a fundamental role in social-emotional development. Studies have found that autistic people perceived affective touch differently using self-report and brain activity recording (e.g., Cascio et al., 2012; Kaiser et al., 2016). Yet it remains unclear how affective touch affects “social brain” activity and functional connectivity in autistic children.

Objectives:

This study aimed to investigate the brain activity and functional connectivity responding to affective touch in children with ASD.

Methods:

Twenty-three autistic boys (\( M_{\text{age}} = 5.72, SD = 0.42 \)) and twenty-three age-matched typically developed boys (\( M_{\text{age}} = 6.01, SD = 0.62 \)) participated in our study. Their sensory processing function was parent-reported by the Sensory Processing and Self-Regulation Checklist (SPSRC, Lai et al., 2019). A lower score represented a less typical performance. Before the formal experiment, an experimenter gently brushed participants on their right forearm and palm for one second and asked participants how pleasant they felt about the touch. Children needed to rate their pleasantness on a 1-5 Likert scale (1 = “not at all” and 5 = “extremely”). During the formal experiment, children’s fNIRS signals were measured by NIRSport (NIRx Medical Technologies, LLC; sampling rate: 3.47 Hz). The experiment contained two conditions (brushing forearm or palm) and ten blocks for each condition.

Results:

First, we analyzed the pleasantness rating data and its correlation with sensory processing. Autistic group (\( M = 4.89, SD = 0.32 \)) rated both types of touch more pleasant than TD group (\( M = 4.29, SD = 0.81 \)), \( F(1,41) = 18.16, p < .001 \). We found no main effect of condition nor interactive effect between group and condition (Figure 1A). The pleasantness of the forearm brush was negatively correlated with the sensory under-response score, \( r = -.36, p = .02 \). Pleasantness of the palm brush was positively correlated with the sensory over-response score, \( r = .38, p = .012 \), see Figure 1B. Second, we explored touch-evoked brain activity in ASD and TD groups. In the ASD group, the left somatosensory cortex (SMS) and left middle superior temporal sulcus (mSTS) showed significant activations to palm brush > forearm brush (\( ps < .01 \)). In the TD group, the left posterior STS, the bilateral middle frontal gyrus (MFG), and right inferior frontal gyrus (IFG) revealed significant activation to forearm brush > palm brush (\( ps < .05 \), Figure 2A). Finally, we conducted a psychophysiological
interaction (PPI) to measure functional connectivity between brain regions. We set the left somatosensory cortex as a seed region. The functional connectivity between left middle STS, right MFG, right somatosensory cortex, and the seed of left somatosensory cortex in TD children was stronger when children were brushed on the forearm than the palm (ps < .05, Figure 2B). However, no difference was found in ASD children between two conditions.

Conclusions:

Autistic children exhibited hypo brain response in the “social brain” and somatosensory cortex during affective touch than non-affective touch. They did not have robust connectivity between SMS and the “social brain” as TD children did.

409.065 (Poster) Identification of Brain Functional Network Substrates of ASD Subtypes According toIQ Imbalance: A Transformer-Based Graph Neural Network Model

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Background: Adaptive functioning and intelligence are important features when assessing the phenotypic heterogeneity of autism spectrum disorder (ASD). Discrepancy between verbal and non-verbal intelligence is prevalent in ASD children and has been suggested as a distinct subtype of ASD, but the neural correlates underlying IQ imbalance has not been well investigated.

Objectives: The purpose of this study was to classify ASD subtypes according to verbal and non-verbal IQ imbalance profiles by applying a transformer-based graph neural network model (GNN) model to learn graph representation related to cognitive imbalance.

Methods: We utilized the resting-state fMRI data of the Autism Brain Imaging Data Exchange I, II (ABIDE) database. After preprocessing quality control, 411 ASD individuals with available scores IQ were selected. IQ discrepancy scores were calculated by subtracting the performance IQ (PIQ) from the verbal IQ (VIQ) score. Individuals with VIQ-PIQ greater than or equal to 15 standard score points were assigned to the VIQ > PIQ group; those with VIQ-PIQ less than or equal to -15 points were assigned to the PIQ > VIQ group; those with a discrepancy between -14 and 14 points were assigned to the “no-discrepancy” (ND) group. As a result, 76 were included in the VIQ > PIQ group, 243 were included in the no-discrepancy group, and 90 were included in the PIQ > VIQ group.

Preprocessing of the fMRI data was performed according to the following steps: removing the first 5 volumes, slice-timing correction, realignment, spatial normalization into MNI, and smoothing with a 6-mm FWHM Gaussian kernel and quality control.

To construct a functional connectivity matrix for an individual, we used the AAL(Automated Anatomical Labeling) atlas. We averaged rs-fMRI time series at each ROI and computed a functional connectivity matrix based on Pearson’s correlation of functional time series between every pair of ROIs (94 x 94). The resulting Pearson correlations(r) were normalized to z via Fisher’s z-transformation. Prior to training, the inter-site variability and the covariate effect of sex and age at MRI scan were removed using element-wise Combat harmonization and linear regression methods. The matrix was then proportionally thresholded with a sparsity of 5% to remove noisy elements, resulting in an undirected and binarized matrix. In our model for graph classification, each layer consists of a transformer self-attention network followed by a GNN layer such as GCNs for considering the structure of graph.

Results: After graph learning, the graph classification accuracy (%) on the test sets was 59.04 ± 0.86.

Conclusions: We introduced a deep learning algorithm for classification using the brain functional network. We adopted a transformer-based GNN model leveraging the transformer on all input nodes. We propose an algorithm that can consider the unsupervised transductive setting to address the limited availability of class labels.

409.066 (Poster) Identifying Barriers to Successful EEG Collection in Autistic People with High Support Needs: An Example of Phelan McDermid Syndrome and Autism

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Background:
Autistic people with high support needs are often excluded from or unable to access neurophysiological research, such as Electroencephalography (EEG), due to the complexity of their needs and/or limitations in existing research practices. Phelan McDermid Syndrome (PMD) is a rare synaptopathy associated with moderate to severe Intellectual Disability (ID) and autism. Promoting EEG research within synaptopathies could further our understanding of synaptic biology in autism. Existing research data can be used to identify barriers to successful EEG collection.

Objectives:

- To assess phenotypic differences between PMD and idiopathic Autistic (iASC) participants.
- To assess the frequency of EEG collection across our sample.
- To identify any phenotypic differences between successful and unsuccessful EEG collection.

Methods:

Autistic traits were assessed using the Autism Diagnostic Observation Schedule (ADOS-2), and Verbal Mental Age (VMA) and Non-Verbal Mental Age (NVMA) were assessed using the Mullens Scales of Early Learning (MSEL). EEG was typically collected at the same visit, though researchers were flexible around family schedules. Parents completed the Autism Diagnostic Interview Revised (ADI-R) and Vineland Adaptive Behaviour Scales 2nd edition (VABS-II) with a researcher, plus online questionnaires about their child, including The Aberrant Behaviour Checklist (ABC), Child Behaviour Questionnaire (CBQ-short), Reiss Scales, Brief Sensory Experience Questionnaire (Brief SEQ) and the Short Sensory Profile (SSP). Participants were grouped according to successful or unsuccessful EEG collection and descriptive and phenotypic variables were compared.

Results:

23 PMD & 31 iASC participants (N=54) were assessed at time of reporting. Age ranged between 2-24 years with 1 PMD outlier aged 47. Males were overrepresented in iASC (n=28, \( p < .001 \)). 74% of PMD participants met criteria for autism spectrum based on research assessment. On average, PMD participants had lower NVMAs (Mdn = 1.25 years, \( p < .001 \)) and adaptive functioning (Mdn = 44, \( p < .001 \)) than iASC participants (Mdn = 2.75 years, Mdn = 59). Parents also reported less Restricted & Repetitive Behaviours (RRBs) on the ADI-R (Mdn = 7, \( p < .001 \)) than iASC (Mdn = 7, \( p < .001 \)). EEG data was collected from 36 out of 54 (67%) participants (19 PMD, 17 iASC). Data was not collected from 17 participants (3 PMD, 14 iASC) due to refusal (n=15), excessive movement (n=1), or lack of time (n=1). We found that EEG collection was more likely with PMD than iASC participants (\( \chi^2(1, N=52) = 5.255, p = .022 \)) but age, NVMA, and level of adaptive functioning did not differ between successful and unsuccessful EEG collection. Unsuccessful EEG collection was characterised by increased levels of fear (U = 10.500, \( p = .015 \)) and discomfort (U = 14.500, \( p = .042 \)), as well as heightened hyper-responsiveness (U = 7.000, \( p = .020 \)) and visual/auditory sensitivity (U = 167.500, \( p = .014 \)).

Conclusions:

Autistic people with high support needs may benefit from strategies that aim to reduce fear and discomfort around EEG data collection. Researchers may also want to pay attention to the responsiveness of participants and the visual and auditory components of an EEG session to maximise potential for successful EEG collection.

**409.067 (Poster)** Increased Absolute and Relative Gamma Power and Reduced Relative Alpha Power in Autism: A Meta-Analysis of Resting-State EEG Power across Canonical Frequency Bands

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Background: Autism is associated with structural and functional neural anomalies. Narrative reviews of resting-state EEG power findings have broadly suggested a U-shaped profile in autism, with increased delta, theta, beta, and gamma power and decreased alpha power compared to neurotypical individuals. Yet, these EEG power differences have not been systematically synthesized, limiting the potential use of resting-state EEG power as a biomarker to enhance the efficiency of early autism diagnosis. In addition, there remains a need to characterize how various study characteristics (e.g., eyes-closed vs. eyes-open paradigms) may account for heterogeneous EEG power findings and inform the design of clinical diagnostic processes.

Objectives: Using a meta-analytic approach, we quantified resting-state EEG power differences between autistic and neurotypical individuals across absolute/relative delta, theta, alpha, beta, and gamma frequency bands. We also examined resting-state paradigm as a potential moderator of effect sizes.

Methods: We used PRISMA standards to conduct systematic literature searches in multiple electronic databases and conference proceedings to identify published and gray literature that compared resting-state EEG power between autistic individuals with a DSM/ICD clinical diagnosis and neurotypical individuals for at least one canonical EEG frequency band. After abstract and full-text screening to
determine eligibility, we extracted sample and study characteristics, including descriptive and inferential statistics for EEG power. For each study and absolute/relative frequency band, we computed Hedges’ \( g \). We performed separate meta-analyses for each absolute/relative frequency band using random-effects models with inverse-variance weights to obtain pooled effect sizes. For significant meta-analytic models, we tested whether pooled effect sizes were different for eyes-closed versus eyes-open paradigms.

Results: Our meta-analyses included 41 studies (149 effect sizes) with a total of 1,246 autistic (82.3% male; \( M_{age} = 9.8 \) years) and 1,455 neurotypical individuals (70.7% male; \( M_{age} = 9.8 \) years). Notably, autistic individuals exhibited greater absolute and relative gamma power (absolute: \( g = 0.44, 95\% \text{ CI} [0.08, 0.79], p = .021 \); relative: \( g = 0.89 [0.46, 1.31], p = .012 \)) and lesser relative alpha power (\( g = −0.36 [−0.63, −0.10], p = .011 \)). In contrast, pooled effect sizes for the remaining absolute/relative frequency bands were not significant (−0.14 \( < g < 0.37, .287 < p < .626 \)). Moderator analyses revealed that pooled effect sizes were of greater magnitude in eyes-closed than eyes-open paradigms for absolute gamma power (eyes-closed: \( g = 0.92, \) eyes-open: \( g = 0.21, p = .046 \)) and vice versa for relative alpha power (eyes-open: \( g = −0.60, \) eyes-closed: \( g = 0.08, p = .004 \)).

Conclusions: Consistent with prior narrative reviews, our meta-analyses demonstrated moderate to large effect sizes of increased absolute and relative gamma power and reduced relative alpha power in autism, suggesting that resting-state gamma and alpha power may be candidate electrophysiological markers for identifying autism. The differential moderating effects of resting-state paradigm for absolute gamma and relative alpha power highlight how diagnostic-focused studies and protocols may need to consider the joint impact of various EEG data collection and analysis parameters. Additional studies that examine participant-level moderators may further contribute to more personalized, psychophysiological approaches for diagnosing autism.

409.068 (Poster) Increased Spatial Variability of Brain Activation in Autistic Adults

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Background: Functional magnetic resonance imaging (fMRI) has been widely used to explore brain differences in autistic individuals, but the resultant literature is full of inconsistent findings. Studies that compare brain activation during the same cognitive processes report hyper-, hypo-, and equal brain activation in autistic individuals compared to neurotypical controls. Behaviorally, autism is characterized by a high degree of variability. Brain-based variability may underlie observed discrepancies in the neuroimaging literature and behavioral variability. While structural MRI analyses have shown greater brain-based variability in autism, no one has systematically examined whether similar variability is found in fMRI data.

Objectives: We compared the spatial variability of activation loci in the brains of autistic and neurotypical adults in response to four categories of stimuli to determine whether autistic individuals showed greater variability in functional brain activation.

Methods: We used an fMRI adaptation task in autistic (n=31) and neurotypical (n=26) adults to maximally activate brain regions most important for representing stimuli across four categories (spoken words, written words, faces, objects), including two modalities (visual, auditory). To examine group differences in spatial variability for each category, we created binarized maps of suprathreshold activation (\( p<0.001 \)) for each participant, and, within groups, identified regions where at least 80% of participants showed overlap (“overlapping parcels”). Between groups, we compared the number and volume of overlapping parcels to determine whether and where groups showed differences in the degree of activation overlap. We then probed whether lack of overlap was related to differences in (1) within-group noise, (2) between-group activation magnitude, or (3) variability in spatial location of participants’ peak activation as compared to other participants in the same group.

Results: Across all stimulus categories, both groups showed the lowest degrees of spatial variability in primary and specialized posterior processing regions including the right fusiform (for faces), the left primary visual cortex (for printed words), bilateral superior temporal gyri (for spoken words), and lateral occipital cortices (for objects). However, autistic adults showed high degrees of spatial variability in the medial prefrontal cortex (for faces) and the left visual word form area (for printed words), including reduced number and size of overlapping parcels. Importantly, increased spatial variability was not a product of increased within-participant noise in the autism group or between-group differences in activation magnitude. Instead, we found increased spatial variability in autistic participants as measured by greater distance between participants’ peak activation in these regions.

Conclusions: The autistic adults show increased variability in the spatial distribution of functional brain activation, primarily in higher-order processing regions associated with face and printed word recognition. Increased variability in the brain was found for perceptual categories that specialize later in development (faces, printed words), suggesting that later-developing processes may be more susceptible to variable representation. These findings may account for contradictions in previous neuroimaging research: the methodologies used for selecting and extracting activation from regions of interest may impact the directionality of group differences. Future findings of activation differences in autistic individuals should be interpreted within the context of spatial variability of brain activation.

409.069 (Poster) A Preliminary Investigation of E-I Balance As a Potential Marker of Adaptive Functioning in ASD
Background: There are currently no known biological markers for autism spectrum disorder (ASD). However, emerging data from post-mortem studies, neuroimaging, and electroencephalography studies suggest that an imbalance between neuronal excitation and inhibition (E-I) may be a promising avenue for investigation of potential treatment targets. E-I balance is reflected in various neuroimaging measures, including the spectral slope of the aperiodic activity in magnetoencephalography (MEG) signals. Despite this promise, the potential of 1/f slope remains relatively unexplored in ASD, especially in the context of treatment response in clinical trials.

Objectives: Our objective was to investigate the feasibility of using 1/f as a potential marker of adaptive functioning and treatment response in ASD.

Methods: We used data from a 16-week, randomized, double-blind, placebo-controlled trial of arbaclofen vs. placebo in children and adolescents with ASD. A subset of participants with resting-state magnetoencephalography (MEG) data and measures of adaptive functioning were included in this study (N = 45; 11 female; age = 12.62 ± 3.25). The sample includes both drug and placebo groups, but the labels remain blinded. MEG data were obtained using a 151-channel CTF system (600 Hz sampling rate) while participants watched a naturalistic movie (Inscapes). Data were epochoched into one-second segments, bandpass filtered (1–150 Hz, 4th-order two-pass Butterworth filter), and eye movement and cardiac artifacts were removed. The resulting data was beamformed to estimate the time series of 90 cortical and subcortical brain regions, and Welch's method was used to estimate power spectral density for each region. The 1/f slope of the power spectrum, suggested to be a marker of E/I, was estimated using the FOOOF method between 5–45Hz for each region and averaged across the brain. We measured the socialization domain of adaptive functioning using the Vineland-3. Linear regression was used to examine the association between the averaged global spectral slope and baseline and change in the Vineland score (social subscale). A square root transformation was used to linearize the association between 1/f and Vineland scores. Age, sex, and collection site were included as covariates in the model.

Results: Regression analysis revealed a significant positive association between the Vineland social score at baseline and the square root of 1/f (regression coefficient=68.5±30.65, F(4,33)=3.83, p=0.03). The association between change in the Vineland scores and 1/f was not significant. Visual inspection of the data revealed high variability in the data and the potential existence of subgroups (Figure 1).

Conclusions: An important limitation of the study is group assignments (drug vs placebo) were unknown at the time of analysis. Despite this, our results provide very preliminarily, but promising support for the feasibility of using 1/f as a potential marker of adaptive, although future studies are needed to replicate these findings in larger cohorts. We also found large heterogeneity in the data, motivating future investigations of subgroups and drivers of variability as well as additional analyses to understand the effect of group on response.
To investigate rsfMRI connectivity within and between the FPN and DMN in children with autism with and without intellectual disability (above and below IQ of 70).

Methods:

Resting-state fMRI was acquired during natural nocturnal sleep in 123 (45 female) children aged 2 to 4 years with autism spectrum disorder. Seventy-two children (22 female) had developmental quotients in the range of ID (< 70) (ID+ASD group) (M=50.6 SD=0.7, Range=2769) and 51 children (23 female) had developmental quotients within the normative range (≥ 70) (ASD group) (M=84.8, SD=10.6, Range=70-111). Intellectual ability and autism diagnosis were assessed by clinical psychologists using the Mullen Scales of Early Learning and the Autism Diagnostic Observation Schedule (ADOS). Resting-state images were preprocessed using the Configurable Pipeline for Analysis of Connectomes (v.1.84; Craddock et al., 2013). Images were time-shifted, motion-corrected, filtered (01-<0.08Hz), and registered to structural then MNI space. Volumes with frame-wise displacement greater than 0.25mm were removed, which did not significantly differ between groups (p=71; with mean scrubbed being 23.5 from 300-frame scan). Time-series from white matter and cerebral spinal fluid, 24-degree motion, and global signal were entered as nuisance regressors. Correlations were computed between time-series extracted from regions within the FPN and DMN defined by the CC200 atlas (Craddock et al., 2012). Multivariate distance matrix regression assessed multivariate differences in rsfMRI connectivity within the FPN and DMN, and between these networks. Follow-up univariate analysis identified regions with the greatest differences in connectivity.

Results:

Significant multivariate differences were revealed within the FPN (p=0008), led by hyper-connectivity between the angular gyri and superior medial frontal regions and between the middle temporal gyrus and the precuneus, and hypo-connectivity between the supramarginal gyri and bilateral inferior parietal cortex (FDR q<.05) in the ID+ASD group. Significant multivariate differences were evident in the DMN (p = .006), led by hyper-connectivity between the posterior cingulate cortex and bilateral angular and middle temporal gyri (q<.05) in the ID+ASD group. Significant multivariate differences were also observed in correlations between the FPN and DMN (p=0.0044), led by hyper-connectivity between left middle temporal and right inferior parietal cortex/supramarginal gyrus and between right superior parietal cortex and left lingual gyrus in the ID+ASD group (q< .05).

Conclusions:

Results indicate that ID in autism is associated with alterations to intra-network rsfMRI connectivity within the FPN and DMN and decreased separation between the FPN and DMN. This is consistent with research suggesting that individual differences in intellectual functioning and its impairments are associated with FPN-DMN interactions.

409.071 (Poster) Investigating Differences in Resting State Functional Connectivity across Sensory Phenotypes in Autism

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Background: One of the most common features of autism is differences in sensory processing: autistic individuals report sensory differences in the visual, auditory, tactile, gustatory, and olfactory domains. Although sensory differences are commonly reported in autism, the presentation of these symptoms vary drastically across individuals. For instance, Scheerer et al. (2021) recently identified five distinct sensory phenotypes across a large sample of autistic individuals. These distinct sensory sub-groups also differed in their behavioral profiles, suggesting that these phenotypes are clinically significant. These sensory phenotypes likely arise from differences in the brain’s functional architecture. However, the neural mechanisms underlying sensory phenotypes in autism has yet to be investigated. Here, we used functional connectivity measures, or correlated neural activity associated with the integration of different brain areas underlying complex mental processes, to examine neural differences between sensory phenotypes in autism.

Objectives: The aim of the current project was to: 1) investigate the pattern of differences across sensory phenotypes in autistic children and adolescents, and 2) explore how these sensory phenotypes are related to differences in resting state functional connectivity.

Methods: Data was obtained from the Province of Ontario Neurodevelopmental Disorders Network (POND) dataset. Participants (N = 638, mean age = 9.8, males = 590) were included in our study if they were autistic, and if their parents had completed the Short Sensory Profile (SSP). A k-means clustering analysis was conducted to group participants based on their pattern of scores on the SSP. We then analyzed resting state fMRI data collected in a subgroup of these participants (N = 147, mean age = 11.8, males = 111). Specifically, we parcellated the brain based on the Schaefer et al. (2018) atlas and obtained functional connectivity matrices for each participant. From these matrices, we calculated measures of connectivity strength, and network segregation and integration, including global efficiency,
modularity, and normalized clustering coefficients, across 7 functional brain networks from the Yeo et al. (2011) parcellation (figure 2a). Lastly, we compared these functional connectivity metrics for each of the sub-groups obtained from the clustering analysis.

**Results:** The k-means clustering analysis (figure 1) revealed five distinct groups based on their SSP scores. We labeled these phenotypes as followed: 1) sensory adaptive (SA), 2) generalized sensory differences (GSD), 3) taste and smell sensitivity (TSS), 4) under-responsive and sensory seeking (URSS), 5) movement difficulties with low energy (MDLE). Compared to the SA group, patterns of resting state functional connectivity (figure 2) differed across the four other groups in both sensory and higher-level networks. Specifically, the GSD and TSS groups tended to show patterns of hyper-connectivity, whereas the URSS and MDLE groups tended to show patterns of under-connectivity.

**Conclusions:** These results confirm previous work identifying distinct sensory phenotypes. Importantly, these results suggest that these distinct sensory phenotypes are associated with broad differences in the brain’s functional architecture, not only in low-level sensory networks, but also networks associated with higher-level cognitive processes. This reflects findings over the past decade that have shown that sensory differences cascade to influences higher-level cognitive development.

**409.072 (Poster) Investigating the Impact of Controlling Sex and Developmental Stages on Brain Signal Variability in Autism**

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Background: Autistic people exhibit unique traits and behaviors. The underlying mechanism of the traits and behaviors may be explained by the variability of brain signals. Previous research has highlighted that the brain signal variability will alter by aging and sex. On the other hand, autism used to be male preponderance. More and more studies argue that the specific impact of sex in autistic people should be considered.

**Objectives:**

We aim to determine whether the brain signal variability changes along with age and differs among brain regions across developmental stages from childhood to young adulthood in autistic individuals with or without controlling gender.

**Methods:** The functional magnetic resonance images of 344 participants with ASD and 399 controls from Autism Brain Imaging Data Exchange dataset were analyzed. The brain variability was measured using standard deviation of the blood oxygen level-dependent signal obtained from each gray matter voxel. First, to build a smoother age trajectory of brain variability, all participants were grouped using partially overlapping sliding age-windows at a step of 5 years. Second, we used the general linear model to investigate the differences in brain variability between ASD and controls at voxelwise level as well as parcellated 90 brain regions. The p-value was corrected for multiple comparison with the false discovery rate method and was set at 0.05 (F=25), and the cluster level was set at 30. We also used sex as a controlling factor to identify the impact of gender.

**Results:** When compared by combining all participants in two groups without considering their developmental stages and sex, there were no significant differences in variability (p=.28). However, in two groups without considering their developmental stages and sex, there were no significant differences in variability (p=.28). Moreover, we found that when participants were divided into age groups and controlling sex, significant brain signal variability appeared in each developmental stage (p<.0001). The most proportion of voxels with significant signal variability was found to be in the age group of 10–14-year-old group, adolescents. The main brain regions that have shown significant sex-by-group differences differ across age groups, most of them include the precuneus, posterior cingular cortex, and precentral cortex.

**Conclusions:**

Taken together, these findings suggest that brain signal variability of autistic individuals changes with age and the dominant brain regions with significant brain signal variability also differ at each developmental stage. And sex do exhibit it’s influence that have to consider rigorously when investigating autistic people.

**409.073 (Poster) Language Development in Children with and without Autism Via the N400 Event-Related-Potential Component and Functional Magnetic Resonance Imaging**

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**Background:** During speech comprehension, prediction may facilitate faster language processing in which the ongoing context of a sentence can be used to predict sentence outcome by limiting subsequent word likelihood. Context-dependent predictions are influenced by semantic and syntactic comprehension, which can be measured via event-related potentials (ERPs) and functional magnetic resonance imaging (fMRI). Two event-related potentials (ERPs), the N400 and P600 components, respond to context-dependent violations with amplitude modulations, and are suggested to measure semantic and semantic/syntactic processing respectively. Similarly, prior MRI
Behavioral research has suggested that the language abilities of individuals with Autism Spectrum Disorder (ASD) develop differently.

Objectives: The purpose of this study was to use EEG and fMRI to characterize language development, specifically semantic and syntactic processing, in neurotypical (NT) children and children with ASD.

Methods: Using a standardized semantic stimulus set (Toffolo et al. 2022) and a syntactic stimulus set while we record brain activity via EEG and fMRI, our study compared language processing between NT (n=18) and ASD (n=7) children across three distinct age groups: 6-7, 8-9, and 10-12 years.

Results: In NT children, both the N400 and P600 ERP components matured throughout language development in response to semantic errors, showing reductions in amplitude, latency, and bilateral scalp topography with age. As a whole, they also showed activation differences in response to semantic and syntactic errors. In response to semantic errors, the ASD N400 ERP component had reduced amplitudes when compared to the NT N400. Furthermore, functional activation did not differ between semantic and syntactic error contrasts in children with ASD. Neither experimental group showed a P600 in response to syntactic errors.

Conclusions: Preliminary data suggested differences in language processing between children with and without ASD. The outcomes of this study could benefit individualized intervention and provide information on developmental language trajectory with complementary information from fMRI and EEG methodologies.

409.074 (Poster) Language-Related Functional Connectivity in ASD: A Systematic Review of fMRI Studies
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Background: Autism spectrum disorder (ASD) is associated with disrupted brain functional connectivity (FC; Di Martino et al., 2013). However, studies of over- versus under-connectivity in ASD have yielded inconsistent evidence, and prior reviews have been relatively general in nature and inconclusive (e.g., Muller et al., 2011; Vissers et al., 2012). Language-related FC is of theoretical and clinical significance because language skills vary widely in autism (Eigsti et al., 2011) and because the typical language network is well defined (Briggs et al., 2018). Thus, studies of language-related functional connectivity represent an ideal domain in which to test evidence of over- and under-connectivity in ASD.

Objectives: To perform a systematic review of (1) local FC within the language network and global FC between language and out-of-network regions for task-based and resting-state studies, and (2) to examine associations among neural FC and behavioral measures of ASD symptomatology and language.

Methods: Our approach followed PRISMA and Cochrane (2021) guidelines (Figure 1). Literature searches in PubMed, PsychInfo, Scopus, ProQuest (grey literature), and Google Scholar included these search terms: ASD, functional magnetic resonance imaging (fMRI), and language. Inclusion criteria were: ASD samples; fMRI; language-related connectivity. Raters naïve to research questions and hypotheses screened Title/Abstract/Keyword. Full-text screening and quality ratings (informed by GRADE Handbook; Cochrane, 2021) were conducted by CL & HRT. Final data extraction and synthesis were conducted by CL & JC.

Results: A sample of 96 articles was included, with autistic groups compared to neurotypical (non-autistic) peers. Task-based language studies demonstrated that ASD groups had local over-connectivity within the language network and global under-connectivity with out-of-network regions (Figure 2.) The exception to this pattern was within-network under-connectivity in response to social tasks. Resting-state studies demonstrated under-connectivity of interhemispheric language regions and over-connectivity of language and default mode network regions. Behaviorally, language-related local over-connectivity and global under-connectivity was related to increased ASD symptoms, whereas relatively greater connectivity within the language network and between out-of-network regions was associated with relatively greater language abilities.

Conclusions: Language-task elicited FC in ASD is characterized by local over-connectivity and global under-connectivity. Results inconsistent with this generalization reflect the presence of social demands or the engagement of a task-negative (default mode) network. Behavioral associations support theories that local over-connectivity and global under-connectivity characterize ASD. In contrast, greater language region connectivity with other language regions and non-language regions was associated with relatively better language skills, suggesting that language function requires significant within and between network integration. This study reveals a relatively consistent language-elicited connectivity profile in ASD alongside new insights and will guide future theoretical considerations of connectivity in ASD.
Background: Theta and alpha band oscillations measured with electroencephalography (EEG) while viewing dynamic videos may provide a sensitive measure of social brain development. Social communication skills in autistic participants are related to adaptive behaviours and quality of life during adulthood. Developing robust measures of social brain development that are scalable, feasible, and rapidly derived is an important step to translational research. Preprocessing of EEG however can be time consuming when done manually, but this is the gold standard for infant data. Automated pipelines have been developed but have only been validated on datasets with high-density electrode layouts from non-autistic participants within a narrow age range.

Objectives: In the current study, we aimed to compare theta and alpha band oscillations between a manual and automated preprocessing pipeline in a subset of EEG data from a large developmental cohort with autistic and non-autistic 6- to 31-year-olds.

Methods: 59-channel EEG was recorded while autistic and non-autistic participants viewed dynamic videos of women singing nursery rhymes (social) and spinning toys (non-social) as part of the EU-AIMS Longitudinal European Autism Project. Both videos (duration of 60sec each) were presented twice. Out of the 539 available EEG datasets, we randomly selected a subset of 131 datasets. These EEG datasets were cleaned a) manually (as in Garcés et al., 2022) (blind to age and diagnostic group), b) using the original MADE pipeline, and b) using an in-house adapted version of the MADE pipeline with modified bad channel selection and interpolation criteria. We then extracted spectral power and functional connectivity (debiased weighted phase lag index) across the theta (4-7Hz) and alpha (8-12Hz) frequency bands across all epochs; social and non-social epochs; and difference between conditions (social – non-social). Intra-class correlations (ICCs) were calculated between manual and automated pipelines if the number of clean epochs was sufficient (≥20 for spectral power and ≥120 for connectivity). We considered the following ranges: poor - ICC <.40, fair – .40≤ ICC <.60, good – .60≤ ICC <.75, and excellent – ICC ≥.75.

Results: Our random sample consisted of 76 (18 females) autistic and 55 (25 females) non-autistic participants (age 7 –31yrs, mean = 17, std = 6). Inclusion rates in the random sample were similar across pipelines for spectral power, but closer to the manual pipeline for the in-house MADE pipeline than the original MADE pipeline. For spectral power, ICCs were in the excellent range with both MADE pipelines for both frequency bands and combinations of conditions (all, separate, difference). For connectivity, ICCs were excellent for measures in the alpha band for comparisons with both MADE pipelines. ICCs in the theta band were fair and good for the original MADE pipeline, but good and excellent for the in-house MADE pipeline.

Conclusions: Our in-house adapted version of the MADE pipeline provides similar inclusion rates and estimates of neural oscillations during the viewing of dynamic videos as our manual pipeline. This suggests that our in-house MADE pipeline is comparable to manual cleaning and is suitable for analysis on our full sample and follow-up cohorts.

Background: Lateralisation of brain processing is a well-known and evolutionary preserved phenomenon which may serve to optimise brain functioning. For example, in human auditory communication, there is a left hemispheric lateralisation for speech processing and a right hemispheric lateralisation for voice identity recognition. Autism is associated with atypical functional lateralisation of the cerebral cortex for language processing. Since most models and studies in auditory communication focus on cerebral cortex functioning, functional lateralisation for speech and identity processing at the subcortical level and its alterations in autism are unclear.

Objectives: We here investigated lateralisation for speech and identity recognition in the inferior colliculus (IC), a central midbrain structure of the auditory pathway, in typical development and autism. We chose the IC because we recently found atypical IC- functioning in voice perception (i.e., reduced voice identity and vocal sound perception) in autism (Schelinski, Tabas & von Kriegstein, HBM, 2022).

Background: Theta and alpha band oscillations measured with electroencephalography (EEG) while viewing dynamic videos may provide a sensitive measure of social brain development. Social communication skills in autistic participants are related to adaptive behaviours and quality of life during adulthood. Developing robust measures of social brain development that are scalable, feasible, and rapidly derived is an important step to translational research. Preprocessing of EEG however can be time consuming when done manually, but this is the gold standard for infant data. Automated pipelines have been developed but have only been validated on datasets with high-density electrode layouts from non-autistic participants within a narrow age range.

Objectives: In the current study, we aimed to compare theta and alpha band oscillations between a manual and automated preprocessing pipeline in a subset of EEG data from a large developmental cohort with autistic and non-autistic 6- to 31-year-olds.
Methods: We tested functional lateralisation of the IC in different aspects of voice processing in three independent functional magnetic resonance imaging (fMRI) experiments in groups of adults with autism and pair-wise matched typically developed controls (matched on age, sex, handedness, and full-scale intelligence quotient (IQ)). First, participants performed tasks on voice identity and speech recognition (voice identity recognition experiment, \( n = 16 \) per group). Second, participants performed speech recognition tasks on speech that was either presented with or without noise (speech-in-noise recognition experiment, \( n = 17 \) per group). In the third experiment, both groups passively listened to blocks of vocal and non-vocal sounds (vocal sound experiment, \( n = 16 \) per group). All participants had normal hearing (confirmed with pure tone audiometry) and did not take psychotropic medication. All participants in the autism group had previously received a formal clinical diagnosis and underwent additional clinical assessment including the ADOS and ADI-R. For the fMRI analysis we used linear mixed-effects models. We focused on two regions of interest (left and right IC). We corrected all \( p \)-values across all comparisons using the Holm-Bonferroni method.

Results: We found that recognising clear speech was associated with dominant processing (i.e., enhanced blood-oxygenation-level-dependent (BOLD) responses) in the left as compared to the right IC in typically developed controls only. In controls only, the right IC showed enhanced responses when recognising voice identity and speech-in-noise as compared to when recognising clear speech. There was no such significant lateralisation for clear speech, voice identity or speech-in-noise recognition within the ASD group. The right IC-lateralisation for voice identity as compared to speech recognition was significantly different between the two groups. Further, there was no significant IC-lateralisation for more general voice processing (i.e., when passively listening to vocal sounds) in none of the two groups. The autism and the control group did not differ significantly in the average amount of head movements (all \( p \) values > 0.1 in all three experiments).

Conclusions: Our results suggest lateralisation effects for specific voice functions at the subcortical level in typical development. Further, our results indicate atypical lateralisation in voice processing in autism which may already occur subcortically.

409.077 (Poster) Looking for Visual Cortical Activity As Putative Brain Biomarker: A Pilot FNIRS Study on Autistic Females Preschoolers

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Background:

Autism spectrum disorder (ASD) is a complex neurodevelopmental condition highly impacting the health-care system and society. Large heterogeneity of the disorder is reported and tailored intervention are needed to improve developmental outcome. In this frame, search of reliable, objective and quantitative biomarkers to assess the function of cerebral circuits represents an important advance to refine the diagnostic and therapeutic pipeline in ASD field to support clinical phenotypization (i.e. in female phenotype). Functional near-infrared spectroscopy (fNIRS) is a totally non-invasive and user-friendly technique, providing an indirect measure of neural activity through the quantification of changes in the concentration of different species of hemoglobin. Several studies, indeed, employed fNIRS to investigate brain activation patterns underlying the core symptoms of ASD (Conti et al., 2022), showing a hypoactivation of several circuits.

Objectives: As part of a larger project, we set-up an observational monocentric study on preschoolers females with idiopathic ASD with the following aims: i) to apply a novel standardized set-up procedure with high entertaining value to measure hemodynamic responses (HDR) in autistic preschoolers; ii) to compare HDR response in autistic preschoolers female vs typically developed preschoolers; iii) to investigate laterality of HDR response as an intrasubject biomarker measure.

Methods: Twelve females with idiopathic ASD (median age 4.5 years; SD 1.17) and 13 age-matched control females (median age 4.86; SD 1.17) were recruited at IRCCS Fondazione Stella Maris, Pisa. ASD diagnosis was performed according to the DSM-5 criteria and supported by ADOS2; children with genetic alterations or developmental quotient below 70 were excluded. All children performed 20 minutes of fNIRS registration to measure brain response (HDR) while watching a cartoon containing a radial checkerboard-blended stimuli. (see Mazzotti et al 2021, *Translational Psychiatry* for procedure) A t-test analysis was used to compare the two groups and lateralization index was calculated too.

Results: i) a significant HDR to the cartoon-based stimulus in the cohort of children with typical development and in the ASD population was obtained, both in the average response across channels and in the channel with the highest response amplitude ii) a statistical difference (\( p < 0.05 \)) in the HDR of the two groups comparison was found, specifically revealing lower average amplitude of OxyHemoglobin (OHB) in ASD females iii) the laterality index revealed a predominance shift towards right hemisphere in typical subject while a loss of brain asymmetry was found in the ASD cohort. (\( p < 0.05 \))

Conclusions: The high portability and experimental flexibility make fNIRS a powerful imaging tool for very young children, bringing functional studies of brain circuits into a more naturalistic environment. To our knowledge, this is the first neuroimaging research exploring
hemodynamic cortical response studied by fNIRS signal in a fully female cohort of autistic preschoolers. Moreover, it adds novel insights into the neurobiological underpinnings of ASD (female phenotype), studying more in deep visual perception. Though loss of brain asymmetry in ASD has mainly reported in language related circuits, evidence exist about involvement of non-verbal networks, too, including both higher cognitive/associative domains and primary sensorimotor function i.e. visual processing.

409.078 (Poster) Low-Gamma Power Effects on Competitive Joint Action with Peers
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Background: Autism spectrum disorder (ASD) is highly comorbid with attention alterations and is recently reported to be accompanied by social and motor deficits, such as in managing joint action (JA). Competitive manipulations have been reported to improve social competence and Theory of Mind in individuals with ASD. However, the mechanism for the improved executive joint motor control in competition in ASD has not yet been elucidated. Recent reports of hyperactivation in executive attention neural hubs, seen thus far by higher low-gamma power during resting state may account for this effect. It is important to assess how task performance is related to this neural alteration in ASD.

Objectives: To assess diagnostic group effects on performance (accuracy and reaction time) during competitive JA with peers and to understand the effects of low-gamma power on competitive executive control outcomes in ASD.

Methods: 76 children (ASD=50), ages 8.17-17.20 years (M\text{ASD}=12.50±2.73; M\text{TD}=12.46±2.79) were paired with same-diagnostic group peers to perform an interactive competitive day-night inhibitory control task. The task includes trials that required JA responses with the partner. Each player’s success was displayed on the monitor for both partners to see, to increase competitive priming. Task accuracy and RT were recorded using E-prime 2.0, and dual 8-channel EEG data were recorded from attention network hubs. EEG electrodes were placed at bilateral prefrontal cortex (PFC), and midfrontal cortex (midFC) for the executive attention network, bilateral ventrolateral prefrontal cortex (VLPFC), and bilateral temporoparietal junction (TPJ) for the orienting attention network, and central occipital lobe. Children were screened for IQ (WISC-IVH).\text{HEA}.

Results: Correct (p=.022, see fig 1a) and incorrect response times (RT, p=.007, see fig 1b) were prolonged in ASD, yet accuracy didn’t differ between groups (p=.990, see fig 1c), suggesting a trade-off between RT and accuracy in ASD. Further elevated low-gamma power in ASD during JA in the left PFC, midFC, left TPJ, and right TPJ (all p<.05). The effect of low-gamma power in the left PFC (p=.005), midFC (p=.001), and right TPJ (p=.016) on correct RT were moderated by diagnostic group (see fig 2a). Moderations were significant for those with ASD, indicating a diminished power presents with prolonged correct RT (see fig 2b) and no other dependent measures.

Conclusions: Findings indicate a compensation path in ASD for executive inhibitory control, derived from elevated low-gamma power in the executive attention network and the rTPJ, overlapping the orienting attention and social brain networks. This effect, found during competition with peers with ASD, suggest that stronger low-gamma power among children with ASD serves as an adaptive regulatory compensation mechanism which is vital for social interaction. These findings shed light onto the pathways involved in the improved executive performance seen in competitive social interactions in ASD, and highlights its potential role in increased social competence in ASD.

409.079 (Poster) Machine Learning Models for Autism Screening from EEG Signals of Children in Sleep
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Background:

Early detection of children who are at risk for neurodevelopmental disorders such as Autism Spectrum Disorder (ASD) can help initiate early clinical interventions. Longitudinal studies have shown that deviations in neurophysiological data such as Electroencephalography (EEG) from early developmental years in children being highly associated with behavioral abnormalities in later years [1]. The analysis of complex, non-linear and high dimensional EEG signals warrant advanced analytical approaches to identify patterns for early biomarkers. Advancements in machine and deep learning (ML/DL) can be exploited to develop computational models to determine differing classes of cohorts through pattern recognition of EEG data.

Objectives:
This study aims at developing an ML model for classifying ASD from non-ASD cohorts using low frequency components in NREM Sleep EEG up to Alpha band in preschool children. Emphasis is laid on projecting the ability of ML to learn the discriminatory patterns between the sleep stages.

Methods:

54 children (43M, 11F, mean=44.7 mo., SD=15.2 mo.) with ASD and 38 children (23M, 15F, mean=44.2 mo., SD=12 mo.) with other neurodevelopmental disorders, between 24 and 72 months in age, underwent EEG recording in daytime sleep on a 64-channel EGI GES400 system using HydroCel GSN130 sensor-net. Data was recorded at 1000Hz, with 70Hz Low-pass filter and Cz online reference. Sleep stages 1,2,3 referred as N1, N2, N3 were observed with at least one stage per child. Annotation of artifact free clean segments in all stages was performed manually by an EEG expert. N1 (43 ASD and 32 non-ASD subjects), N2 (40 ASD and 32 non-ASD subjects) and N3 (25 ASD and 25 non-ASD subjects) data was analyzed.

Offline pre-processing involved down-sampling to 250Hz across 60 channels, rejecting bad channels and band-pass filtering from 1-16Hz. The pre-processed data was transformed with db4-wavelet to extract Delta, Theta, and Alpha band coefficients. ML algorithm - Support Vector Machine with Radial Basis Function Kernel was applied to develop a classifier to distinguish ASD from non-ASD cohorts. The input feature consists of band coefficients derived from 10s windows EEG signals. A 10-fold cross validation was performed and performance metrics (accuracy, sensitivity, specificity, F1-score, Standard Deviation among cross-validation scores) reported for each sleep stage.

Results:

The results of the classification are mentioned in the table below. N2 has better accuracy with F1 score and higher detection rates for both classes indicated by higher sensitivity and specificity. N1 and N3 has relatively higher predictability for non-ASD than ASD indicated by specificity scores.

Conclusions:

We propose an ML approach to distinguish ASD from Non-ASD cohorts using EEG signals across three sleep stages in preschoolers. The overall metrics for N2 indicate the strength of model’s predictability while N1 and N3 show 50% chance of predicting ASD even though their predictability of non-ASD is better than N2. A recognized divergence in sleep spindles in N2 may underlie these observations [2]. Explorations in larger samples across genders, to aid early detection is warranted.

409.080 (Poster) Medial Prefrontal Cortex Connectivity Differences in Youth with Autism Spectrum Disorder Compared to Early-Onset Psychosis

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Background: Theory of mind (ToM) refers to the ability to read others minds and predict their actions (Overwalle, 2009). The medial prefrontal cortex (mPFC) is found to play a role in ToM (Moriguchi et al., 2007). Autism spectrum disorder (ASD) and early-onset psychosis (EOP) are both characterized by ToM deficits and altered connectivity in regions associated with social cognition (Ciaramidaro et al., 2014). However, few studies have looked at ToM and related social network differences in ASD and EOP in the adolescent/young adult age group.

Objectives: To examine whole brain functional connectivity of the mPFC and its relationship to social cognition measures in a group of youth with either ASD and EOP, compared to typically developing (TD) controls.

Methods: Resting-state MRI data were acquired on a 3T Siemens scanner for 24 adolescents with ASD (mean age = 15.86) 25 adolescents with EOP (mean age = 18.65), and 21 TD controls (mean age= 17.08). Data were preprocessed using FSL (Smith, 2004) and AFNI (Cox et al., 1997), and included motion correction, nuisance regressors (white matter, cerebrospinal fluid,), and bandpass filtering (0.008 < f < .08 Hz). A 10mm mPFC seed was created in MNI space using coordinates from prior studies (von dem Hagen et al., 2013; Fox et al., 2005). Global time series were extracted from this seed and correlated with whole brain signal. Final connectivity maps were normalized using Fisher r-to-z transformations. Z’ (prime) scores from clusters of significance in each group were used to run Pearson’s correlations to examine the relationship between mPFC connectivity and The Awareness of Social Inference Test total score and subscale scores (do, say, think, feel; TASIT; McDonald et al., 2003).

Results: ASD and EOP youth demonstrated mixed patterns of over- and under- whole brain connectivity of the mPFC compared to TD controls. ASD group showed overconnectivity of the mPFC with bilateral middle occipital gyrus; but underconnectivity with right superior
Methodological Strategies for Improving Data Quality and Retention across Multi-Site Studies of Early EEG Biomarkers in ASD


Background: Autism spectrum disorder (ASD) is characterized by core social communication and behavioral deficits that emerge after the first year of life. Accumulating evidence suggests that altered brain development presents early in infancy, placing immense value on scalable neural biomarkers of ASD. The Infant Brain Imaging Study (IBIS) was established to uncover functional differences between neurotypically developing children and those who receive an autism diagnosis at 24 months of age using fMRI. Electroencephalography (EEG) was added to IBIS to provide a direct measure of brain activity in awake and engaged infants and to further enhance the scalability of identified biomarkers. Although EEG is less vulnerable to motion than other neuroimaging modalities, infant recordings often contain a high degree of artifact contamination with <50% of infants on average with useable data (Cuevas et al., 2014).

Objectives: We aimed to establish a standardized protocol to acquire EEG data from a population of 250 infants at higher likelihood (HL) of ASD (identified based on the presence of an older diagnosed sibling). Our primary goals were to maximize data quality and retention utilizing a standard protocol across sites, thus ensuring results were valid and reliable rather than a depiction of site-specific recording discrepancies.

Methods: Strategies to standardize effective data collection across sites included (1) training and setup procedures, (2) standardization of data recording methods, and (3) the incorporation of detailed post-processing and data quality checks. Each site was provided a self-contained computer for presenting and reporting stimuli, ensuring there would be no interference from other studies. The data analysis team worked with each site individually to tailor training based on level of expertise. Upon review of each data file, behavioral feedback was disseminated to the respective site within 24-48 hours of file upload. Data was evaluated for number of artifact free seconds/trials for resting state, VEP and AEP, respectively. Percentage of data retained per infant for each paradigm was calculated to evaluate the success of our methods.

Results: Data retention rates were consistently over 60% across all infants and all study paradigms (Table 1). Over 300 seconds of clean resting state EEG data was preserved on average per infant. Data acquisition consistently improved across the study since the incorporation of our extensive feedback procedures. Prompt analysis of data files also allowed for quick identification of technical errors, ensuring no future data was affected.

Conclusions: Large cohorts of HL infants are needed to improve the generalizability of studies of autism in infancy and to advance our ability to identify clinically relevant biomarkers. Continued acquisition of high-quality data is essential in time-limited and longitudinal studies such as IBIS. Our methods have repeatedly and reliably increased the amount of data retained from each infant across all five study sites, providing us a larger and more diverse dataset to analyze. This has led to significantly higher data retention rates compared to many infant studies. Implementation of our data collection and standardization methods is also relevant for other clinical populations with small sample sizes, including genetic syndromes.

Minimal Neural Differences during Facial Emotion Recognition between Autistic and Non-Autistic Adults in High-Powered fMRI Study

409.082 (Poster) Minimal Neural Differences during Facial Emotion Recognition between Autistic and Non-Autistic Adults in High-Powered fMRI Study

Background: Autism spectrum disorder (ASD) is characterized by core social communication and behavioral deficits that emerge after the first year of life. Accumulating evidence suggests that altered brain development presents early in infancy, placing immense value on scalable neural biomarkers of ASD. The Infant Brain Imaging Study (IBIS) was established to uncover functional differences between neurotypically developing children and those who receive an autism diagnosis at 24 months of age using fMRI. Electroencephalography (EEG) was added to IBIS to provide a direct measure of brain activity in awake and engaged infants and to further enhance the scalability of identified biomarkers. Although EEG is less vulnerable to motion than other neuroimaging modalities, infant recordings often contain a high degree of artifact contamination with <50% of infants on average with useable data (Cuevas et al., 2014).

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Results: Data retention rates were consistently over 60% across all infants and all study paradigms (Table 1). Over 300 seconds of clean resting state EEG data was preserved on average per infant. Data acquisition consistently improved across the study since the incorporation of our extensive feedback procedures. Prompt analysis of data files also allowed for quick identification of technical errors, ensuring no future data was affected.

Conclusions: Large cohorts of HL infants are needed to improve the generalizability of studies of autism in infancy and to advance our ability to identify clinically relevant biomarkers. Continued acquisition of high-quality data is essential in time-limited and longitudinal studies such as IBIS. Our methods have repeatedly and reliably increased the amount of data retained from each infant across all five study sites, providing us a larger and more diverse dataset to analyze. This has led to significantly higher data retention rates compared to many infant studies. Implementation of our data collection and standardization methods is also relevant for other clinical populations with small sample sizes, including genetic syndromes.
Background: Years of research have examined the neural underpinnings of facial emotion recognition in Autism Spectrum Conditions (ASC). To date, no consistent picture emerged as to whether and under which conditions the presumed neuro-functional differences between autistic and non-autistic individuals exist. One explanation for the contradictory results may derive from the wide degree of heterogeneity in the expression of autistic traits among individuals on the spectrum. In order to progress towards clarifying the ‘facial emotion processing hypothesis’ it is therefore necessary to simultaneously go wide (i.e. increasing sample sizes) and deep (i.e. thoroughly screening participants for individual characteristics).

Objectives: In this study, we aimed to identify neuro-functional differences in facial emotion processing between autistic and non-autistic adults, using the largest sample size published to date and employing a comprehensive test battery controlling for autistic traits, co-occurring conditions and intelligence.

Methods: Using functional magnetic resonance imaging (fMRI), 51 adults diagnosed with ASC and 51 non-autistic controls completed a facial emotion recognition task including 3 conditions: Gender recognition with neutral faces (Gender Recognition), gender recognition with emotional faces (Implicit Emotion Recognition) and emotion recognition with emotional faces (Explicit Emotion Recognition). Prior to the measurement, various questionnaires were collected.

Results: On the behavioural level, the ASC group revealed lower accuracies in the Explicit Emotion Recognition condition compared to the control group. Additionally, reaction times were higher across all three conditions within the ASC group. On the neural level, whole-brain analysis using a full-factorial model including the factors Group and Condition revealed one significant group difference when contrasting Explicit Emotion Recognition with Gender Recognition. The ASC group demonstrated stronger activation differences between Explicit Emotion Recognition and Gender Recognition in the right middle frontal gyrus. No further significant suprathreshold activation differences between groups were found in any other contrasts.

Conclusions: Three aspects of facial emotion recognition in a large sample of autistic and non-autistic subjects revealed that processing of facial information on gender and emotion is slower in autistic subjects, as they showed overall longer reaction times. Accuracies of autistic subjects were only lower in Explicit Emotion Recognition, which was associated to increased prefrontal brain activation in the right middle frontal gyrus. Whole-brain analysis did not identify any ‘usual suspects’ for differences in emotion recognition, such as amygdala, superior temporal sulcus or other areas comprising the social brain network. Paradoxically, the sample size related increase in power comes with a reduced number of significant findings compared to previous similar studies. This negative relationship could be caused by a reduction of sampling variability, which in turn could have led to significant effects due to specific sample compositions. In conclusion, these results urge for a thorough subgroup-analysis by the means of psychometric and behavioral covariates.

409.083 (Poster) Neural Correlates of Atypical Predictive Processing in Adults with Autism

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Background: The ability to make self-other sensory distinctions is a process critical to prediction, self-monitoring, and differentiating relevant and irrelevant stimuli. Predictive coding allows individuals to generate internal models of the environment and adapt to discrepancies between expected versus actual sensory events, which influences sensory processing, social cognition, and perception (Clark 2013; Van de Cruys et al., 2014). In autism, impairments in social communication, sensory, and motor symptoms represent key features and may be influenced by deficits in these predictive processes (Whyatt & Craig, 2013; Palmer et al., 2015). Previous research has shown diminished suppression of self-generated stimuli, potentially providing support for alterations in motor-auditory predictive coding in autism (van Laarhoven et al., 2019). If similar predictive processing deficits also impact social cognition in autism, then similar patterns of diminished suppression to socially-generated stimuli might be expected.

Objectives: This study used electroencephalography (EEG) to examine atypical predictive coding processes in autism. Based on previous research implicating atypical predictive processing in autism, we hypothesized that suppression of predictable self- and socially-generated sensory events would be reduced in autism as compared to typically developing controls.

Methods: High-density EEG was recorded from 24 autistic adults (26±6 years; 8 Female) and 20 controls (26±5 years; 10 Female). The paradigm consisted of 200 trials and had four conditions: self-generated, computer-generated, socially-generated, and motor control. In the self-generated condition, participants produced an auditory stimulus when they pressed a button. In the socially-generated condition, an experimenter next to the participant pressed a button to generate an auditory stimulus every 2-3 seconds while participants passively
Results: Controls showed significant N1 suppression for both self-generated versus computer-generated trials \((t(19) = -3.03, p = 0.014)\) and socially-generated versus computer-generated trials \((t(19) = -5.80, p < 0.001)\). In contrast, autistic adults did not show significant N1 suppression for the self-generated conditions \((t(23) = -1.24, p = 0.23)\), but did show significant N1 suppression for socially-generated stimuli \((t(23) = -2.65, p = 0.014)\). However, suppression of socially-generated conditions in ASD trended towards being significantly weaker than in controls \((t(41) = -1.99, p = 0.054)\).

Conclusions: We found that autistic individuals are characterized by a lack of significant N1 suppression to self-generated stimuli and reduced N1 suppression relative to controls for stimuli generated by a social other. These two findings converge in supporting deficits in predictive signaling in autism and may be indicative of differences in action-oriented predictive processing affecting both interoceptive signaling and social cognition in autism. Indeed, if individuals with autism cannot attenuate neural response to predictable input, this work may shed on mechanisms underlying deficits in self-monitoring, prediction, and sensitivity to external sensory events.

Methods: Data for the current analyses were collected during the Autism Biomarkers Consortium for Clinical Trials (ABC-CT). Two hundred eighteen autistic children (24.77% female; \(M_{age}=8.75\pm1.61\) years; \(M_{age}=99.59\pm17.65\)) provided electroencephalography (EEG) data during viewing of faces (neutral female, upright and inverted) and non-faces (upright houses), and P100 and N170 components were extracted for each condition. The Aberrant Behavior Checklist and the Child and Adolescent Symptom Inventory-5 were used to measure irritability and generalized anxiety (GA), respectively. Multiple linear regressions were performed to examine whether irritability scores predicted P100 and N170 amplitude and latency to faces and non-faces.

Results: Regression models with irritability, GA, age, sex, and IQ as predictors were significant for P100 amplitude to upright faces \((F(5,201)=5.43, p<.001, R^2=97.1\%)\) and houses \((F(5,208)=3.59, p=.004, R^2=5.72\%)\) and N170 latency to upright \((F(5,201)=7.55, p<.001, R^2=13.73\%)\) and inverted faces \((F(5,200)=5.35, p<.001, R^2=9.59\%)\). Children with higher irritability trended towards lower P100 amplitudes to upright faces \((\beta=0.77, t=1.73, p=.086)\) and inverted faces \((\beta=-0.87, r=1.81, p=.071)\). Higher irritability also predicted longer N170 latencies to upright \((\beta=4.02, t=1.85, p=.066; trend level)\) and inverted faces \((\beta=6.26, r=2.36, p=.019)\), while children with higher GA trended towards shorter N170 latencies to upright \((\beta=0.26, r=1.73, p=0.085)\) and inverted faces \((\beta=0.34, r=1.82, p=.070)\). There were no relationships between irritability and P100 amplitude to inverted faces, N170 latency to houses, or P100 latency or N170 amplitude in any condition \((all p>.10)\).

Conclusions: Hypotheses were partially supported. In a sample of autistic children, higher irritability predicted lower P100 amplitudes to upright faces and houses, suggesting that higher irritability may relate to generally reduced attention allocation. Higher irritability predicted longer N170 latencies to upright and inverted faces, contrasting prior irritability research conducted with a non-autistic sample. Moreover, higher irritability predicted shorter N170 latencies to faces. These results suggest that variability in irritability and anxiety may account for some of the heterogeneity in face perception in autistic children.
INSAR 2023 ANNUAL MEETING ABSTRACTS

409.085 (Poster) Neural Engagement during Social Approach and Avoidance in Autistic Adults without Intellectual Disability
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Background:
Successful human interaction involves not only correct recognition but also an appropriate reaction to facial affect. Autism spectrum condition (ASC) has been associated with a decreased desire to approach positive social cues as well as a lack of automatic avoidance of negative social cues. Previous studies have observed such discrepancies on a behavioural level; meanwhile, the investigation of the neural underpinnings has received limited attention.

Objectives:
In this study, we aimed to untangle the differential impact of autism on social approach-avoidance processes, by examining the neural and behavioral responses during explicit approach-avoidance ratings towards positive and negative social cues.

Methods:
Using functional magnetic resonance imaging (fMRI), 43 adults diagnosed with ASC and 48 non-autistic controls completed two explicit social approach-avoidance rating tasks. Participants rated their approach-avoidance tendencies towards 90 trials of happy, neutral, and angry faces (a) via a 3-button choice (approach, no tendency, or avoidance) during fMRI scan and (b) on a 9-point Likert scale outside the scanner.

Results:
On the behavioural level, the two groups differed only on the approach-avoidance ratings of happy faces but not the ratings of neutral or angry faces, i.e., the ASC group rated happy faces as less approachable than the control group. On the neural level, whole-brain analysis with t-contrasts directly comparing the two groups for each condition revealed significant group differences, again, only for the happy (versus neutral) condition. The ASC group demonstrated stronger activation in the cerebellum, fusiform gyrus, inferior and medial frontal cortex, and medial superior frontal cortex during the perception and imagination of approaching or avoiding happy faces. No suprathreshold activation in the angry (versus neutral) was observed when contrasting the two groups. Region-of-interest analysis demonstrated marginally increased activation of the left caudate in the ASC group compared to the controls.

Conclusions:
Reduced social approach tendencies were found in autistic adults, which were also reflected in stronger neural activation of a widespread network during the approaching of happy faces. Those regions have been associated with motor and cognitive control, planning, and especially inhibitory control when selecting between actions, suggesting that adults on the spectrum may engage in more response suppression process when envisioning themselves approaching others. Meanwhile, autistic adults do not avoid negative social cues more than their peers, either on a behavioral level or a neural level.

Note. The data collection and analyses of this study will continue after the submission. Therefore, upon acceptance, a larger sample size and further analyses (e.g., parametric modulation, neural-behavioral correlations) may be included.

409.086 (Poster) Neural Processing of Phonological Information in Kindergarteners with ASD and the Relation to Reading Outcomes
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Background: Very little is known about which factors contribute to academic success for children with autism spectrum disorder (ASD). Phonological processing is a foundational skill for reading development (Wagner & Torgesen, 1987), but the link between phonological processing and reading skills in children with ASD has not been studied in depth using both behavioral and electrophysiological methods.

Objectives: (1) To examine the relation between neural processing of phonological information and reading ability in kindergartners with ASD; (2) to determine how this relation differs between typically developing (TD) children and children with ASD; (3) to explore how this relation changes from kindergarten entry to exit in children with ASD.
Methods: 56 children (28 ASD; 28 TD) completed an “Old/New” ERP paradigm at kindergarten entry; 38 children with ASD also completed the paradigm at exit. Children also completed reading subtests from the Woodcock Johnson-IV (WJ-IV) Tests of Achievement. EEG activity was recorded while children listened to two rhyming pseudowords /gibu/ and /bidu. In an initial sensitization block, children heard one token repeated 50 times. In the second block, 100 tokens were randomly presented, including 50 “new” and 50 “old” tokens. We first conducted a Generalized Linear Mixed Model (GLMM) with P1 EEG amplitude as the dependent variable. Stimulus (old vs. new), group (ASD vs. typical), and reading achievement levels (WJ-IV Letter-Word Identification and Passage Comprehension standard scores), and their interactions were included as independent variables. Analyses controlled for sex, nonverbal IQ, and age. For children with ASD, we also examined the interaction between timepoint (kindergarten entry vs. exit), stimulus (old/new) and reading achievement levels.

Results: Results revealed a marginally significant three-way-interaction between Letter-Word Identification, stimulus, and group (p = .08) (Figure 1). To further examine the three-way interaction, we conducted post-hoc tests for children with “lower” and “higher” Letter-Word ability, using a median split. Results revealed that, among children with ASD with “lower” Letter-Word ability, P1 amplitude was significantly greater for new compared to old stimuli (p = .03). There was no significant difference between old and new stimuli for typically developing children (p = .70) or children with ASD with “higher” Letter-Word ability (p = .76). The three-way interaction between Passage Comprehension standard score, stimulus, and group was not significant (p = .16). Longitudinal analyses also revealed a marginally significant three-way interaction between time, stimulus, and reading achievement in children with ASD (Letter-Word: p = .06; Passage Comprehension: p = .04). Post hoc tests revealed that the difference between old and new stimuli in children with ASD was significantly greater at kindergarten entry compared to kindergarten exit (Letter-Word: p = .07; Passage Comprehension: p = .04).

Conclusions: Results indicate that the neural measure of one’s ability to process unfamiliar nonword stimuli may predict reading abilities in kindergarteners with ASD. This association was strongest at kindergarten entry. Given that children with ASD showed an atypical neural pattern of phonological processing compared to typical peers, targeting this skill prior to kindergarten will be critical to promote reading achievement.

409.087 (Poster) Neural Response to Social and Monetary Reward in Autism Spectrum and Comorbid Internalizing Symptoms
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Background: The social motivation hypothesis posits that core social deficits of autism are due to atypical reward processing (Chevallier et al., 2012). Research has indicated that individuals with autism exhibit decreased reward-related brain activation in response to social (i.e., domain-specific) and potentially nonsocial (i.e., domain-general) feedback (Clements et al., 2018). In addition, autism is highly comorbid with internalizing psychopathology—which has also been linked to abnormal neural reward response (Bress et al., 2012; Kessel et al., 2015). Inconsistent previous findings may be due to the complexity of internalizing behavior, which may be better captured through symptom dimensions. It is unclear if autism-related deficits in neural reward sensitivity are impacted by comorbid internalizing symptoms.

Objectives: This study utilized electroencephalography to examine the relationship between neural reward response and autism symptoms in young adults. We hypothesized that 1) individuals with greater autism symptoms would exhibit smaller social and monetary neural reward response, and 2) internalizing symptom dimensions would moderate this relationship, producing greater neural reward response attenuation for those with elevated autism and multiple dimensions of internalizing symptoms.

Methods: The sample included 114 18-30-year-old students (Table 1). Participants self-reported autism symptoms via the Social Responsiveness Scale, Second Edition (SRS-2). Participants self-reported distress and fear/obsession symptoms via the Inventory of Depression and Anxiety Symptoms — Expanded Version (IDAS-II). In the social reward task, participants guessed which peer ‘liked’ a photo of them. In the monetary reward task, participants guessed which door contained a monetary prize. Tasks were matched on trial structure, timing, and feedback, with 60 trials and equal correct/incorrect outcomes. Continuous EEG was recorded using the BioSemi ActiveTwo system, digitized with a 1024Hz sampling rate. Feedback-locked epochs were extracted 200ms before feedback onset. The reward positivity (RewP), an event-related potential component indexing reinforcement learning and reward system activation, was calculated as the mean activity at FCz electrode, 250-350ms following feedback. Domain-specific RewP was calculated as the residual for social independent of monetary reward, and vice versa. Domain-general RewP was calculated by averaging social and monetary RewP. Hierarchical regression was used to examine the interactions between autism, distress, and fear/obsession symptoms in relation to RewPs.

Results: For domain-specific RewP, there were no significant effects involving autism, distress, and fear/obsession symptoms. For domain-general RewP, results indicated a trend main effect such that greater autism symptoms related to a smaller RewP (β = .25, t = -1.92, p = .057). There was also a significant interaction (β = .001, t = 3.73, p < .001) such that the negative association between autism symptoms and domain-general RewP was greatest with high fear/obsessions and low distress, or vice versa (Figure 1).

Conclusions: This study suggests greater autism symptoms relate to blunted neural response to social and nonsocial reward in young adults. These findings support prior research evaluating the social motivation hypothesis, suggesting that reward dysregulation underlies autism features. The interaction between autism, fear/obsessions, and distress dimensions indicates that reward processing is further dysregulated in individuals with autism and specific internalizing symptom combinations. This finding has important implications, as individuals with
autism-related social impairments often develop internalizing psychopathology in adolescence.

409.088 (Poster) Personal Relevance and Emotional Face Perception in Autism Spectrum Conditions
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Background:
Difficulties in social interaction are one of the core features of Autism Spectrum Conditions (ASC). Neuroimaging research has shown that these difficulties are accompanied in alterations in the neural processing of faces in general, and of emotional facial expressions in particular, although previous results are heterogeneous.

Objectives:
In this study, we aimed to investigate the role of personal relevance in face processing in ASC. In non-autistic participants, personal relevance (i.e. faces of relevant others) has been shown to increase activations in the core and extended face processing network. We hypothesize that personal relevance in ASC might have the same effect, and might thereby also enhance emotion processing, i.e., that the personal relevance of a face might be a crucial moderator in the processing of an emotional facial expression. Thus, we expect to replicate reduced or absent effects of emotional facial expressions in response to stranger’s faces, whereas these effects might be preserved in response to personally relevant faces.

Methods:
Participants with ASC and matched controls (N=23 per group, mean age 32.9 years) performed an emotion recognition task on photographs of a personally relevant person and a matched stranger, displaying fearful, happy, and neutral facial expressions, while we recorded simultaneous EEG-fMRI.

Results:
Both groups showed significantly increased hemodynamic activity for relevant faces compared to stranger’s faces in the core and extended face processing network, including fusiform gyrus, medial PFC and precuneus, with no significant group differences. Crucially, emotion effects in ASC were limited to relevant faces, while the control group showed emotion effects to both relevant and unknown faces. In EEG data, group differences were evident in early sensory processing, with increased P1 amplitudes to relevant vs. stranger’s faces being observed only for the non-autistic group. Later processing showed effects of personal relevance and emotion without any group differences.

Conclusions:
Our results indicate preserved processing of faces and emotional facial expressions in ASC, specifically for personally relevant faces. Thus, face processing in ASC seems to be characterised by a higher specificity, rather than a general processing dysfunction or alteration. However, there is evidence for alterations of early sensory processing of faces in ASC, in line with previous findings. Our results further speak to the importance of accounting for personal relevance in face processing, in order to allow for the investigation of real-life social information processing.

409.089 (Poster) Potential Neural Correlates of Audiovisual Speech Processing in Autistic and Non-Autistic Youth: A Pilot fMRI Study

Background: Autistic youth demonstrate differences in processing multisensory stimuli, particularly audiovisual speech. For example, autistic individuals tend to be less attuned to the temporal relations between auditory and visual speech components, as indicated by wider temporal binding windows (a wider time interval over which paired auditory and visual stimuli are perceived as a synchronous percept). Prior research has identified several key brain regions involved in multisensory speech processing, including the superior temporal sulcus (STS) and insula, in neurotypical adults. However, it is unclear if activations in these regions are consistent in temporal processing of audiovisual speech in autistic and non-autistic youth.
Objectives: This pilot study applied functional magnetic resonance imaging (fMRI) with a simultaneity-judgment audiovisual speech task to a sample of autistic and non-autistic youth to begin to characterize the neural substrates of temporal processing of audiovisual speech in this population.

Methods: Thirty-eight participants (n = 18 autistic, 20 non-autistic) completed the study. Groups were matched on chronological age, biological sex, and gender. A 3-Tesla fMRI scanner equipped with a 32-channel head gradient coil was used to acquire a high-resolution anatomical scan and to measure BOLD signals from functional scans. During the event-related runs, participants completed a simultaneity judgment task, wherein participants were presented with a neutral-faced adult female speaker saying the syllable “ba,” presented either synchronously or asynchronously (stimulus-onset asynchronies of ±400 ms) and asked to indicate whether they perceived each trial to be synchronous or asynchronous. Images were processed and analyzed using FMRIB’s Software Library. Anatomical and functional images were mapped onto standard Montréal Neurological Institute (MNI) space with 2 mm isotropic voxels, and functional images were smoothed using a Gaussian kernel (FWHM = 5 mm). A general linear model was used to model the fMRI time series using a double gamma hemodynamic response function (HRF), which included regressors of interest plus first temporal derivatives for the four contrasts: synchrony > rest, asynchrony > rest, synchrony > asynchrony, and asynchrony > synchrony. Additional regressors of no interest accounted for artifacts of head motion. A mixed-effects FLAME1 model was used for group level analyses, generating maps for within and between group analyses with a cluster threshold of z > 3 and p < .05.

Results: Results for non-autistic youth were consistent with prior findings in non-autistic adults, with similar key regions involved in temporal audiovisual speech processing, including the posterior STS and anterior insula. Autistic youth, however, demonstrated responses in fewer of these key multisensory regions, with responses limited to visual and motor cortices. Results in several regions associated with audiovisual speech processing, such as the medial temporal gyrus, anterior temporal lobe, and anterior insula, varied according to several participant characteristics, including age, task accuracy, and nonverbal IQ.

Conclusions: These results suggest that there may be differences in the neural mechanisms of audiovisual speech processing in autistic youth and highlight the need to account for participant characteristics when investigating the neural bases of multisensory processing in autistic individuals. Future directions for research and clinical implications will be discussed.
The identification of early biomarkers that can support clinical judgements represents one of the main challenges for researchers, in order to detect as early as possible a risk of autism and start promptly treatments and interventions that can divert the atypical neurodevelopment trajectory. Ultimately, identifying the specific pattern of neuronal development in ASD can give important support to the early diagnostic procedures, that have the potential to change the development of these children. The use of the EEG for the study of children at high risk of developing ASD could be of help in this endeavor.

409.091 (Poster) Quantifying Neural Sensitivity for Subtle Changes in Vocal Identity and Expression Using Frequency-Tagging EEG in Adult Men with and without Autism

Background: Voices convey important social information, such as the identity and emotional state of the speaker. Autistic people may have difficulties processing socio-affective vocal cues, but behavioural findings are inconsistent.

Objectives: Here, we introduce an innovative and robust EEG paradigm that allows to quantify the implicit neural sensitivity for subtle socio-communicative vocal cues at the individual subject-level, and we contrast responses in adults with and without autism spectrum disorder (ASD).

Methods: We examined the neural sensitivity of 27 adult men with ASD and 25 neurotypical controls (matched on age, sex and IQ) to rapidly and implicitly detect subtle changes in vocal identity and vocal expression, using frequency-tagging EEG. Via a series of oddball paradigms, we presented a periodic stream of highly variable vocal utterances at 4 Hz, with an oddball every 3 or 4 utterances (thus at 4/3=1.33 Hz). To examine neural sensitivity to vocal identities, different neutral utterances of the same speaker were presented at base rate, periodically interleaved with neutral utterances of different speakers at oddball rate. To examine neural sensitivity to vocal expressions, base rate utterances of neutral voices were periodically interleaved with an expressive utterance (angry, fearful, happy, and sad, in separate sequences). These distinctive frequency tags for base rate and oddball stimuli allowed direct and objective quantification of the neural identity-discrimination or expression-categorization responses. To determine the impact of low-level acoustic cues aside of the target social cues, we also administered identical sequences with phase and amplitude scrambled utterances, a manipulation which rendered the vocal identity and emotion unrecognizable but largely preserved the acoustic characteristics.

Results: Both paradigms yield robust oddball responses in every participant, thereby offering a reliable quantitative index of the neural sensitivity for these important socio-communicative vocal cues. Importantly, oddball responses for sequences of scrambled utterances were significantly lower or even absent, demonstrating that differences in low-level acoustic features are not the main drive of the observed neural discrimination responses. For the vocal identity discrimination paradigm, we found significantly reduced oddball responses in the autistic versus neurotypical group, indicating substantial difficulties discriminating speakers and segregating speech streams. For the vocal expression discrimination paradigm, we did not observe any differences between both participant groups.

Conclusions: We applied, for the first time, an auditory frequency-tagging EEG paradigm to pinpoint neural sensitivity for changes in vocal identity and expression. We found that male adults can implicitly differentiate vocal emotions and speaker identity in a stream of utterances. While the brains of autistic adults are as sensitive as those of neurotypical controls to selectively categorize emotionally expressive vocal utterances, they are significantly less responsive towards differences in speaker identity. In light of the fast, implicit, double-objective and robust nature of this new EEG approach, it may open up perspectives for clinical applications, in particular in paediatric and nonverbal populations.

409.092 (Poster) Reduced Dynamic Functional Connectivity between the Anterior and Posterior Components of the Temporal Parietal Junction May Drive the Association between Attention and Mentalising in Autism.
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Background: Previous studies have consistently reported atypical performance in ASD compared to typically developing (TD) groups during Theory of Mind (ToM) or mentalising tasks, as well as reduced activation and functional connectivity (FC) of the neural network underpinning ToM including in the Temporal Parietal Junction (TPJ). Attention atypicality in orienting, disengaging and reorienting of attention, have also been consistently demonstrated in ASD. Here too, studies have shown atypical activation in regions associated with attention orienting and reorienting (including in the TPJ). It is possible that attention reorienting is intrinsically linked to difficulties in mentalising as the ability to disengage and shift attention to new stimuli could be needed for the development of ToM. Thus, the right TPJ is likely an important interaction point between the mentalising and attention orienting functions in ASD, specifically the interaction between anterior (raTPJ; attention) and posterior (rpTPJ; mentalising) subdivisions of the region.

Objectives: Here we focused on resting state Functional Connectivity (FC) between the raTPJ and rpTPJ as a window into the relationship between attention reorienting and social cognition in ASD compared to TD adults. Since previous static FC studies resulted with both hyper- and hypo-connectivity in ASD compared to TD adults. Since previous static FC studies resulted with both
connectivity states between networks at different time points. We ask whether in ASD there is reduced dynamic FC between the anterior and posterior TPJ and whether this is linked to symptomatology in ASD.

Methods: Dynamic independent component analysis (dyn-ICA) was used to assess general variability in FC of the raTPJ and rpTPJ in two resting-state fMRI adult datasets from the ABIDE database, with the first (ASD = 14; TD = 15) serving as exploratory and the second (ASD = 29; TD = 29) as replication. We also assessed specific connectivity states (from highly negatively to highly positively correlated) in the replication dataset using a sliding-window approach to explore the associations between connectivity states and ASD symptom severity (measured with the Social Responsiveness Scale; SRS).

Results: Our results demonstrate a reduced dynamic FC in ASD compared to TD adults in the exploratory dataset (t = -2.34, p = 0.03, Cohen’s d = 0.88), which was also evident in the replication datasets (t = -2.21, p = 0.03, Cohen’s d = 0.60). Furthermore, increased dynamic FC in ASD predicted decreased behavioural symptoms (β(se) = -138.51(54.91), t = -2.52, p = 0.018, η² = 0.197). Additional regression analyses revealed that for ASD, decreased symptom severity was predicted by engagement of the highly positive state, but engagement of the highly positive state predicted increase in symptoms.

Conclusions: Dynamic FC between the raTPJ and rpTPJ appears to be important in ASD and is perhaps driven by an increased engagement of a highly positively correlated functional state. Previous research points to an antagonistic relation between the attention and mentalising networks and it is therefore plausible that increased positive connectivity in the TPJ and reduced alterations and changes of connectivity states underlie attention and mentalising atypicalities in autism.

409.093 (Poster) Sensory Processing and Visual Evoked Potentials in Individuals in with and without Autism Spectrum Disorder: The Gendaar Study

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Background: Sensory processing issues are prevalent in autistic individuals with over 96% autistic children reporting either hypo or hyper sensitivity in multiple domains and often persist into young adulthood (Marco et al., 2011). Visual evoked potentials (VEP) collected via EEG recordings are a reliable measure of early stage visual processing and provide an understanding of the workings of the visual processing system. Previous studies have shown a decrease in P100 amplitude from VEP in autistic adolescents and young adults (Kovarski et al., 2016) but not in autistic children (Webb et al., 2022).

Objectives: The goal of this project is to (1) look at group and gender differences in sensory sensitivities and visual evoked potentials P100 and N100 amplitude and (2) relationship between sensory processing and basic visual processing (P100, N100) in adolescent and young adults with and without autism.

Methods:

196 participants (ASD = 95) ages 12-26 years from the NIH funded ACE GENDAAR study were included in the preliminary analysis. Autism diagnosis was confirmed via the ADOS-2. Participants viewed videos of flickering checkerboards displayed for 500 msec with a central red fixation point while high density EEG was collected for a total of 200 trials. Analysis focuses on the midline occipital region (average of electrodes 70, 74, 75, 82, 83), primary dependent variable is P100 amplitude and secondary variable is N100 amplitude.

Participants also completed the sensory profile self report, a 60 item questionnaire that reported on different sensory sensitivities with questions 17-26 focused on visual processing. Raw scores were calculated for visual processing questions and for sensory sensitivity and sensory avoiding quadrants.

Results:

Preliminary analysis showed no group differences in visual processing raw scores (t = 4.83, p > 0.05), but showed significant differences in sensory sensitivity (t = 5.94, p < .05) and sensory avoiding (t = 8.08, p = 0.05). Sex differences were observed in sensory sensitivity (t = -3.49, p < .05) and sensory avoiding (t = -2.89, p < .05) for autistic group but not for TD (all ps > .05). Secondary analysis will focus on the subset of samples that provided valid EEG data for VEP P100 and N100 amplitude and sensory processing scores (visual processing raw, sensory sensitivity and sensory avoiding). Standard scores from sensory sensitivity and sensory avoiding will be grouped into hyper (scores between 41 - 75) and hypo sensitivity (scores between 15 - 26). We expect (1) autistic group to show reduced P100 and N100 amplitude based on previous research in adolescents and young adults and (2) individuals with higher hypersensitivities to have reduced amplitude and vice versa.

Conclusions:
Preliminary analysis showed autistic groups scoring higher in sensory sensitivities and sensory avoiding quadrants as consistent with previous research but not in the visual processing sub section. Autistic females scored higher in sensory sensitivity and sensory avoiding quadrants indicating the variability in sensory concerns for autistic males and females. Next steps will focus on the secondary analysis of how visual evoked potentials might integrate with sensory processing behaviors.

409.094 (Poster) Sex Differences in Atypical Predictive Processes from Low Spatial Frequencies in ASD: Evidence from Mismatch Responses to Filtered Faces.
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Background:
Fast visual recognition in non-autistic adults relies on coarse information conveyed by Low Spatial Frequencies (LSF), which possibly triggers predictions. Atypical predictive processes have been observed in autistic individuals. In visual perception, this might be related to a bias toward local information conveyed by High Spatial Frequencies (HSF). By reducing predictions in autism, this bias might impair facial processing. Additionally, sex differences have been reported in autism, including during attention to faces, but need further investigation.

Objectives:
The objective of the present study was to investigate if autistic individuals have impaired predictive processes from LSF during face processing and if there were sex differences.

Methods:
The Mismatch Response (MMR) being an electrophysiological correlate of the prediction error, an oddball paradigm was employed in 40 autistic and 48 non-autistic individuals while recording their scalp activity with a 96-EEG channels cap. An unfiltered face was used as the standard stimulus, whereas HSF and LSF-filtered faces were deviants. Assuming that LSF were at the root of predictive processes, a smaller prediction error (i.e., smaller MMR) to deviants containing only LSF compared to deviants containing only HSF was expected in non-autistic individuals. In contrast, this difference was expected to be reduced in autism.

Results:
Cluster statistics and ERP analyses on MMR over parieto-occipital areas both revealed that LSF-filtered face deviants lead to a smaller prediction error than HSF-filtered face deviants in two time-windows (130-230 ms and 350-450 ms after stimulus onset). However, cluster statistics show that this difference was reduced in autism during the second time window (p clustered = .03). Planned comparisons on ERP showed that the difference in amplitude between HSF-MMR and LSF-MMR was significant in autistic males and females irrespective of the time window (all p < .006) but not significant in autistic males, while in autistic females, it was significant in the early part (130-230 ms; p < .001) but not in the late part (350-450 ms).

Conclusions:
These findings confirm the predictive role of LSF in non-autistic individuals and highlight atypical predictive mechanisms from LSF during face processing in autistic individuals. Additionally, it emphasizes sex differences in autism, in line with recent research. These differences might contribute to better social skills in autistic females and confirm the need for sex stratification in autism research.

409.095 (Poster) Social Functioning in Male and Female Adults with Autism Relies on Similar but Not Identical Neural Mechanisms
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Background: Due to higher incidence of autism diagnosis in males than females, research on biological sex differences has been limited. Recent findings suggest distinct strengths and difficulties in males vs. females with autism. The neural mechanisms underlying sex-related
Objectives: This study aimed to characterize biological sex differences in social cognition in adults with autism by examining neural responses associated with sensory-perceptual processing and spontaneous memory for social and nonsocial stimuli.

Methods: Brain responses to social and nonsocial stimuli were evaluated using visual event-related potentials (ERPs) in 41 adults (17 female, 24 male) with ASD (age 18-35 years, M=24.43 years). All subjects passively viewed 200 color photographs depicting unfamiliar faces and house facades with equal probability. One face and one house were randomly selected and repeated throughout the session (50 repetitions/stimulus type) while the rest were shown only once (50 single presentations/stimulus type). To encourage attention to the screen, participants were asked to press a button in response to an unrelated visual probe (a cartoon drawing; 10 trials). Bilateral occipitotemporal N170 response (130-190ms) amplitude and latency were used to evaluate sensory-perceptual processing. Parietal ERP amplitudes (300-500 ms, 500-800ms) evaluated spontaneous detection of stimulus repetition. Autism Diagnostic Observation Schedule (ADOS-2) and Social Responsiveness Scale (SRS-2) scores provided behavioral measures of autism symptomatology and social difficulties in daily life.

Results:

Brain-behavior correlations indicated that in females, prolonged N170 responses to faces vs. houses. However, only females evidenced neural specialization previously reported in typical populations, with faster N170 responses over the right vs. left hemisphere. Conversely, only males consistently elicited shorter N170 latencies in response to faces than houses. Consistent with prior evidence of reduced incidental memory for faces in autism, neither males nor females exhibited the parietal ERP amplitude enhancement in response to repeated vs. non-repeated faces in the 300-500ms interval. Analysis of the general memory response (500-800 ms) revealed that males but not females detected stimulus repetition, reflected by the reduced ERP amplitude compared to the non-repeated trials, indexing reduced allocation of processing resources.

Conclusions: These findings suggest that adults with autism process social stimuli using the neural mechanisms previously reported in children with autism and in neurotypical populations. Biological sex differences in brain-behavior associations highlight the possible source of variable clinical presentation: females recruit both sensory-perceptual and memory processes for more adaptive functioning, while males rely on sensory-perceptual processes alone.
Results: Twenty-eight participants have been consented to date with n=11 in progress or complete and recruitment/retention that is ongoing and steadily improving. We estimate enrollment of at least 12-15 more participants over the next 6 months. The current preliminary sample includes both males and females with ASD (mean age=5.67,SD=3.01), all of whom exhibited some language delay and high RRB severity as indexed by the CYBOCS-ASD total score (mean=13.00,SD=2.00). Controlling for differences in N-acetylaspartate, changes in the ACC ranged from 3%-16% for Glu (mean=7.79,SD=7.21) and 1%-15% for Glx (mean=5.73,SD=7.64). Changes in the striatum ranged from 0.5-8% for Glu (mean=4.42,SD=5.58) and 0%-22% for Glx (mean=11.01,SD=15.57). Additional control variables are being evaluated.

Conclusions: We observed differences in absolute levels of glutamate in cortical and striatal regions following NAC administration compared to placebo. These findings are in line with the prominent theory that an excitation to inhibition imbalance may underlie the pathophysiology of some aspects of ASD and suggest the previously reported benefits of NAC for RRB in children with ASD may be related to changes in excitatory neurotransmission in CSC. Our next study will examine these relationships in a randomized, controlled trial.

409.097 (Poster) The Dual Effect of OT on Social Perception in Adolescents with ASD: A MEG Study of Neural Connectivity

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Background:

Autism Spectrum Disorder is a neurodevelopmental condition characterized by difficulties in the social domain. In addition to clinical symptomology, studies have shown that individuals with ASD tend to present atypical patterns in face perception. Several studies have shown that oxytocin (OT), a naturally occurring hormone that relates to social communication in mammals, can modulate social behaviors in ASD. However, the mechanism underlying the effects of OT, especially during the early stages of perception, is relatively unknown.

Objectives:

The current work focused on the effects of single-dose OT on the early perceptual processing of social and non-social cues in adolescents diagnosed with ASD. Using magnetoencephalography (MEG), we first investigated the effect of OT on three neural components that relate to face perception: M100, M170, and M250. Next, we examined whether the effects of OT were reflected also in the spatial domain by investigating connectivity patterns between social-related regions, in alpha and gamma neural bands.

Methods: Twenty-five adolescents with ASD participated in a wall-established social task during a randomized, double-blind placebo-controlled MEG and OT administration study. Participants arrived at the lab twice and received an acute dose of intranasal OT or placebo in each session. During each scan in the MEG, participants were asked to identify pictures of social and non-social stimuli. Additionally, 23 typically developing (TD) adolescents performed the same task in the MEG as a benchmark that allowed us to better characterize neural regions of interest and behavioral results for this age group in this task.

Results:

Our results show a dual effect of OT such that single-dose administration impacts in a differential manner on the early perception of social and non-social perception. Throughout social processing, an administration of OT enhances the neural response during the M170 time window in the medial frontal cortex and modulates the connectivity between this region and the fusiform cortex. In addition, OT enhances the overall neural reactivity and increases attention toward the upcoming stimuli regardless of their content.

Conclusions:

The current study highlights the complexity of the effects of OT during early perceptual stages in ASD. By providing a new model composed of both social-related influence and modulation of the overall attention, we provide a new platform for exploring and establishing novel treatments for early attentional phases in ASD.

409.098 (Poster) The First Application of OPM-MEG Technology in Determining Emotional Face Responses in Very Young Children with and without Autism

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Background: In the last decade the role of functional connectivity in the brain has become the main model for understanding brain development, function, and dysfunction. It is well established that adolescents and adults with autism spectrum disorder (ASD) show atypical brain oscillatory activity underpinning critical aspects of cognition and social functioning. Magnetoencephalography (MEG) is the ideal method for measuring functional connectivity, affording far better spatial resolution than other neurophysiological approaches. But MEG has historically shown poor reliability in children under 5 years. However, a recent and innovative optically pumped magnetometers (OPMs) system, is a new, wearable MEG technology that yields a four-fold increased sensitivity compared to classic MEG and nine-fold increased sensitivity over EEG to gamma. OPMs are also uniquely tolerant of head movement, which is a significant advantage when scanning young children. We are the first to scan very young children with OPMs, advancing our understanding of early brain development in autism.

Objectives: Using OPMs we are presenting our initial investigations of evoked responses and functional connectivity in young children (3-4-year-olds) diagnosed with ASD and typically developing (TD) controls.

Methods: OPM data were recorded using a whole-head, 40-dual-axis zero-field magnetometers during the presentation of emotional faces (to elicit evoked responses) in 8 TD (3 males) and 2 children with ASD (2 males). For the evoked fields to the face stimuli, we focused on occipital and fusiform source-space analyses, filtered between 3-40Hz. Functional connectivity to faces using network-based statistics will also be performed in the larger cohort of children with and without ASD.

Results: Our preliminary findings show a clear response to emotional faces in TD children, with M100 seen in the calcarine cortex with a peak amplitude of 5.21nAm±3.11 and latency at 110.38ms±14.78, and a M170 in the fusiform gyri with an amplitude of -14.03nAm±5.71 and latency at 186.88ms±27.46. These latencies are expected to emotional faces at this age. The children with ASD also showed evoked responses to the faces with greater amplitudes and longer latencies than the TDs, showing a M100 in the calcarine cortex with an amplitude of 9.82nAm±4.89 and a latency at 145ms±7.07, and M170 in the fusiform with an amplitude of -22.59nAm±15.03 and latency at 204ms±41.01. For the connectivity analyses, we expect greater connectivity in children with ASD, particularly in gamma, which is thought to reflect an imbalance in excitatory and inhibitory synaptic transmission.

Conclusions: This is the first OPM-MEG study to be performed in young children at the age of diagnosis, who could otherwise not be reliably scanned using MEG. With these data, we will be able to determine if source-space responses to faces, gamma band dysfunction and/or connectivity abnormalities are present at early diagnosis, as well as the relations of these measures of brain function to behaviour, across the autism spectrum. Although we have 10 participants to date in the 3-4-year age range, we have also completed testing on 7 younger children (1–2-year-olds); we expect to have data from >90 children by May 2023, including equal numbers with and without ASD.

409.099 (Poster) The Longitudinal GAMMA Band EEG Activity in Autistic Children
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Background: It has been suggested that in children with autism spectrum disorder (ASD), the cortical brain activity would show an imbalance between excitation and inhibition, which is reflected in atypically high baseline gamma activity. Previous research in gamma band have, however, been conflicting. In some of the studies, heightened gamma activity has not been found, whereas in some studies it has. A part of the research has also shown age-related changes in gamma band activity during the development.

Objectives: The study aimed at investigating longitudinal gamma band EEG activity in autistic children, typically developing children and children with intellectual disability without ASD. The specific aim was to investigate whether the baseline gamma band EEG is atypical in autistic children and whether it is a consistent finding longitudinally.

Methods: Nineteen autistic children (2.5–5.6 years), 19 typically developing children (TD, 2.4–5.8 years) and 17 children with intellectual disability without ASD (ID, 3.5–6.2 years) participated in the study. The baseline EEG was recorded in two different time points with 24 months in-between. EEG was recorded when the children watched a 3-minute video of a person building with Lego bricks. The gamma band activity (24.4–44.0 Hz) was analyzed in central and parietal areas to avoid myogenic artefacts. The group differences were analysed with nonparametric tests due to non-normal distributions and small sample size.

Results: In the first measurement point, the groups differed statistically in parietal gamma band EEG activity (Kruskal-Wallis, H=6.917, p=.031) but not in central gamma band EEG (H=2.841, p=.242). Children with ASD had more increased parietal gamma band power than
TD children (Mann-Whitney U=64,000, p=.027) and children with ID (U=52,000, p=.021). TD and ID groups did not differ in parietal gamma band EEG activity (U=108,000, p=.868).

At 24-months follow-up, the groups no longer differed in either parietal (H=622, p=.718) or central (H=1.488, p=.475) gamma band EEG activity.

For ASD children, both parietal (Wilcoxon Z=−2.040, p=.041) as well as central (Z=−3.296, p=.001) gamma band EEG were statistically larger in the first measurement point, compared to the second. For TD and ID children, the central gamma band EEG was higher in the beginning than in the follow-up (TD Z=−2.906, p=.004; ID Z=−2.803, p=.005), but parietal gamma band EEG showed no difference between the two time points.

Conclusions: The present results suggest that the gamma band activity changes over time in early childhood. The study supports previous studies by showing that the gamma band activity is higher in early development in children with ASD as compared to children with TD and with ID without ASD. However, the autism-specific difference seems to evaporate during the development. The present findings warrant further longitudinal studies with larger samples and multiple measuring points.

409.100 (Poster) Infant Resting State Functional Connectivity Networks Associated with Language Development in a Sample at High and Low Familial Likelihood of ASD


Background: Although much is known about the neurobiology of language in children and adults, relatively little is known about individual differences in the infant brain related to language development. Functional connectivity studies have demonstrated that regions classically associated with language show increased connectivity across the first few years of life (Gao et al. 2015) and are potentially related to later language outcomes (Emerson et al., 2016). As increasing evidence suggests that language is subserved by more broadly distributed regions in the adult brain, whole-brain studies are needed to explore relationships between infant brain networks and emerging language skills. Additionally, there is a need to examine broad measures of language function as well as granular measures of infant vocalizations to establish a comprehensive understanding of the underlying neurobiology.

Objectives: To identify functional brain networks associated with language development in the first two years of life in participants from the Infant Brain Imaging Study, a prospective study of infants at high and low familial likelihood for autism spectrum disorder, representing a broad range of language development.

Methods: Resting state functional connectivity MRI (fcMRI) was collected from sleeping infants at 6 (n = 95), 12 (n = 119), and 24-months (n = 141) using gradient-echo echo-planar image acquisition on cross-site calibrated 3T Siemens TIM Trio scanners. Cross-sectional fcMRI enrichment analyses were conducted to identify infant functional brain networks (Figure) associated with distinct language measures. These included standardized performance-based scores (Mullen Scales of Early Learning Expressive Language [MSEL-EL] and Receptive Language [MSEL-RL]), parent-reported vocabulary (MacArthur Communicative Development Inventories [M-CDI] Words and Gestures Produced and Understood), and granular measures of vocalization behavior coded from audio-visual recordings (speechlike rate, canonical babbling ratio (CBR) and proportion of vocalizations socially directed). fcMRI enrichment analysis addresses multiple comparison problems by identifying networks with an increased density of connections associated with behavior (Eggebrecht et al., 2017). Only network pairs that demonstrate a strong enrichment signal and pass a stringent machine learning, linear regression and PCA-based secondary vetting procedure are reported (Hawks et al., 2021).

Results: See Table for a complete list of significant brain-behavior associations. MSEL-EL was consistently associated with frontoparietal control network (FPC) and Default Mode Network (DMN) connectivity at 6 and 24 months. The MSEL-RL was associated with connectivity involving somatomotor, FPC, or both networks across 6, 12, and 24 months. Parent report measures of vocabulary (M-CDI) broadly showed convergence of network involvement with lab-based measures. Granular vocalization measures yielded a small number of...
specific relationships at 12 months, with CBR associating with DMN connectivity and proportion of vocalizations directed associating with Visual network connectivity.

Conclusions: Findings indicate that across the first two years of life, language development is associated with widespread functional connectivity in the brain, with particularly strong associations with FPC and DMN, and to a lesser extent the SMN and Visual Network. Widespread involvement of brain networks supports a distributed model of language processing, while consistent involvement of a smaller set of networks suggests a degree of specialization and generates testable hypotheses for future studies.

**409.101** (Poster) Visual Evoked Potential Differences in Infants Later Diagnosed with Autism

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Background: There is evidence that the Visual Evoked Potential (VEP), which indexes low-level sensory processing of visual stimuli in primary visual cortex, is altered in ASD. For example, the P1 component was smaller in a sample of adolescents and adults with ASD relative to typically developing peers (Kovarski et al., 2016). Evidence is more mixed in children, with reports of reduced P1 amplitude (Kovarski et al., 2019) and latency (Milne, 2011), though these occurred in the context of increased intra-participant, inter-trial variability in ASD, and group amplitude and latency effects were reduced or eliminated after accounting for this variability (Kovarski et al, 2019, Milne et al., 2011). The VEP matures rapidly over the first two years of life (Kos-Pietro et al, 1997). Thus, there may be developmental influences on ASD-related differences in the VEP, necessitating study of the VEP in infants later diagnosed with ASD. Two questions remain unknown: 1) When in development do differences in VEP associated with ASD emerge? 2) Can differences in VEP be detected before a diagnosis of ASD is made?

Objectives: To understand the early development of VEP in ASD by examining VEP amplitude, latency, and variability in infants later diagnosed with ASD.

Methods: Pattern reversal VEP was measured in 12-month-old infants participating in two concurrent longitudinal studies (see Table). Between 2-3 years of age, infants were either diagnosed with ASD as part of the longitudinal study evaluation, or by community diagnosis by clinical psychologist. VEP was compared between infants with (ASD, n=17) and without (noASD, n=50) later diagnoses of ASD. Infants with unknown diagnostic outcome or elevated familial likelihood but no ASD outcome were not included. ANCOVAs controlling for study and number of segments included after segment rejection were applied to assess group differences in mean amplitude of N1, P2, and N2; N1-P1 and P1-N2 difference; latency of N1, P1, and N2; and inter-trial median absolute deviation (i.e., variability) in P1 amplitude and latency. Correlations between component amplitudes and MSEL Visual Reception scores were assessed.

Results: Infants later diagnosed with ASD had a larger mean P1 amplitude compared to infants not later diagnosed (p<0.05), as well as a larger N1-P1 complex (p<0.05, see Figure). No significant differences were detected in peak latencies, although the N2 latency trended toward being slightly later in infants later diagnosed with ASD (p = 0.055). Across all infants, more negative N1 amplitude was associated with higher 12-month MSEL VR (r = -0.3, p = 0.013).

Conclusions: By 1 year of age, infants later diagnosed with ASD show differences in the VEP compared to infants not later diagnosed, though the nature of these differences (increased P1 and N1-P1 amplitudes) is not consistent with prior reports of differences in older children. Notably, in typical development P1 amplitude declines during this age range, suggesting the possibility that the ASD group has delayed maturation of the VEP. Future research will be needed to determine whether the inconsistency in findings reflects a developmental change or characteristics associated with the sample or task.

**409.102** (Poster) Dataset-Specific Developmental Trajectories of Brain Structure and Function in Neurodevelopmental Conditions: Implications for Replicability

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Background: Neurodevelopmental conditions (NDCs) are associated with disruptions in brain growth and development. With the brain’s structure and function undergoing complex changes throughout childhood and adolescence in both typical and atypical development, many investigations of NDCs attempt to control for age-related effects in their analyses. However, these effects may differ between datasets, challenging the replicability and generalizability of findings.

Objectives: We determined whether the developmental effects in NDCs differed between two independently collected datasets: the Province of Ontario Neurodevelopmental Network (POND) and Healthy Brain Network (HBN).

Methods: Functional magnetic resonance imaging (fMRI) data were extracted for POND and HBN participants (5-19 years old) who were diagnosed with Autism Spectrum Disorder (ASD), Attention-Deficit/Hyperactivity Disorder (ADHD), or Obsessive-Compulsive Disorder (OCD), or who were neurotypical (NT). Functional connectomes were constructed using five-minutes of resting-state data (POND: movies or Inscapes, HBN: fixation-cross) and used to extract the functional connectivity strength of 232 cortical and subcortical regions classified into eight canonical resting-state networks. Normative modeling (controlling for diagnosis) was used to characterize the dataset- and sex-specific developmental trajectories. A bootstrapping approach was used to compare the sex-specific trajectories between datasets. For each iteration (N=10,000), a normative model was constructed using 80% of a primary dataset (e.g., POND), and deviation scores (the degree to which an individual deviates from the normative range of the primary dataset) were extracted for the remaining data (e.g., remaining 20% of POND and alternate dataset, HBN); median deviation scores were computed across all iterations. Differences in median deviation scores between the primary and alternate datasets were evaluated using ANCOVAs, covarying for diagnosis and holding significance at p<0.05.

Results: After propensity matching on age, sex, and head motion, 551 POND (164 ADHD, 217 ASD, 60 OCD, 110 NT) and 551 HBN (374 ADHD, 66 ASD, 11 OCD, 100 NT) participants were included. In both datasets, age explained more variance in functional connectivity strength in females than males in all resting-state networks, particularly the salience and subcortical networks. Age explained more variance in POND than HBN in all networks except the salience network; largest differences were observed in the frontoparietal control and subcortical networks. For females, significant differences in deviation scores between datasets were observed in 24% and 39% of brain regions when normative models were constructed using HBN and POND, respectively, as the primary dataset, with more pervasive effects observed in males (97% and 91% of regions, respectively). In both sexes, when HBN was used as the primary dataset, functional connectivity strength was underestimated for POND participants, while connectivity strength was overestimated for HBN participants when normative models were constructed from POND; largest effects were observed in subcortical regions.

Conclusions: This study is critical in demonstrating that developmental trajectories of functional connectivity strength in NDCs can differ between independently collected datasets. Thus, age is an essential consideration when seeking replicable findings across datasets. Next steps include examining how different age-correction techniques impact findings and their replicability.

409.103 (Poster) Frequency-Specific Differences in Rich-Club Organization in Neurodevelopmental Conditions

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Background: A set of highly connected brain regions called the “rich-club” play a vital role in integrating information across the functional connectome and support a wide range of cognitive functions. Functional magnetic resonance imaging (fMRI) has been used to relate disruptions in rich-club organization to neurodevelopmental disorders (NDDs) such as autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD). Magnetoencephalography (MEG) can provide important information about the neural dynamics underlying the disruptions in rich-club organization in NDDs.
Objectives: This study will be the first to use MEG to investigate rich-club organization in a large sample of children and adolescents with and without NDDs. We quantify rich-club organization in different frequency bands known to support distinct cognitive functions and examine diagnostic differences and interactions with age and sex.

Methods: Resting-state MEG data were obtained from 539 children and adolescents (4-19 years of age) diagnosed with ASD (N=214) or ADHD (N=107), or who were neurotypical (NT; N=218); diagnostic groups were matched on age, sex, and data quality. Functional connectivity networks were constructed for each of the canonical frequency bands (theta: 4–7Hz, alpha: 8–14Hz, beta: 15–29Hz, low gamma: 30–55Hz, and high gamma: 65–80Hz). Rich-club coefficient curves were constructed for each network and statistical significance was assessed. The area under the curve of significant rich-club coefficients was used to quantify each network’s rich-club organization. Linear regression models were used to investigate main effects of diagnosis, age, sex, along with their interactions, on the rich-club organization in each frequency band, holding significance at $p<0.05$, with Tukey post-hoc comparisons for simple effects and simple slopes.

Results: In theta ($F(2, 527)=5.60, p=3.93\times10^{-3}, \eta_p^2=0.02$) and high gamma ($F(2, 527)=8.67, p=1.98\times10^{-4}, \eta_p^2=0.03$), the three-way interaction between age, sex, and diagnosis was significant. In both bands, while the NT children and adolescents showed a significant age-by-sex interaction, with rich-club organization decreasing with age in the females and no significant change with age in the males, neither the NDD females nor males showed significant changes in rich-club organization with age. In alpha, the three-way interaction was again significant ($F(2, 527)=6.76, p=1.26\times10^{-2}, \eta_p^2=0.03$); however, in this band, while the males in all three diagnostic groups showed increasing rich-club organization with age, only the ASD females showed a similar relation, with the NT and ADHD females showing no change with age. In beta, the age-by-diagnosis interaction was significant, with controls showing a weaker, but still significant, positive relation between age and rich-club organization compared to both NDDs. No significant main effect of diagnosis nor its interactions were significant in low gamma.

Conclusions: While the existing fMRI literature reports altered in rich-club organization in NDDs compared to typical development, we, for this first time, established the complex and frequency-dependent nature of these disruptions. Next steps include investigating the associations of rich-club organization with behaviour across the diagnostic groups.

409.104 (Poster) Disruptions in Amygdala-Prefrontal Connectivity Are Associated with Severity of Anxiety and Modulated By Levels of Social Impairment in Autistic Children

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Background: Co-occurring anxiety is prevalent among children with autism spectrum disorder (ASD) and represents a common reason for referral to mental health services. On a neural level, anxiety is associated with disruptions in the functional integrity of brain networks involved in emotion processing and regulation, particularly the amygdala-prefrontal cortex circuit. In autism, the majority of studies have focused on task-based fMRI, and less is known regarding the relationship between intrinsic functional connectivity and anxiety in ASD, which is measured during resting-state fMRI.

Objectives: The present study examined whether disruptions in amygdala-prefrontal connectivity during resting-state fMRI differentiates children with ASD and co-occurring anxiety relative to unaffected controls. We then tested if the severity of social impairment moderates the relationship between amygdala-prefrontal connectivity and anxiety severity in ASD.

Methods: This cross-sectional study included a well-characterized sample of 103 5- to 15-year-old children: 74 with ASD (M age = 11.6 years; SD = 1.8 years; 17 female) and 29 typically developing (M age = 11.5 years; SD = 1.8 years; 11 female). Children completed 12 minutes of resting-state fMRI. A diagnosis of ASD was confirmed with the Autism Diagnostic Interview-Revised (ADI-R) (Le Couteur et al. 2003) and/or the Autism Diagnostic Observation Schedule-2nd edition (ADOS-2) (Lord et al. 2012). All children with ASD had a diagnosis of an anxiety disorder (generalized anxiety disorder, separation anxiety disorder, or social anxiety disorder) based on the Anxiety Disorders Interview Schedule. Standard imaging preprocessing and analysis was conducted using FSL FEAT. Amygdala region-of-interest were created using FreeSurfer segmentations to reflect individual-specific neuroanatomy. The parent-rated MASC-2 and SRS-2 were used as continuous measures of anxiety and social functioning, respectively, in dimensional analyses.

Results: Relative to controls, children with ASD showed hyper-connectivity between the right amygdala and right orbitofrontal cortex (peak MNI coordinates: 22 16 -20; p = 0.01, z=4.36) (Figure 1A). In dimensional analyses conducted within the ASD group (n=74), level of social impairment severity was then found to moderate the relationship between anxiety severity and connectivity between the amygdala and dorsal anterior cingulate (peak MNI coordinates: 24 16 -18, p=0.008, z=4.29)—a region implicated in emotion generation (Figure 1B). That is, increasing levels of anxiety severity was associated with decreasing amygdala-dorsal anterior cingulate connectivity for children with ASD and lower severity of social impairment ($\text{SRS T score} < 74$), but the opposite for children with higher severity of social impairment ($\text{SRS T score} \geq 74$) (a median split T score of 74 on the SRS-2 was used to form social impairment subgroups). All findings remained significant after accounting for potential covariates (IQ, age, SRS, psychotropic medication status). We also conducted a whole-brain, exploratory analysis of brain structure to test the congruency of intrinsic connectivity findings with neuroanatomy. A similar pattern
was found in which severity of social impairment moderated the relationship between cortical thickness in the lateral prefrontal cortex and anxiety severity.

Conclusions: Findings suggest that disruptions in amygdala-prefrontal connectivity is associated with anxiety in children with ASD, which may be moderated by the level of social impairment.

409.105 (Poster) Large-Scale Networks of Anxiety in Autistic Children Based on Intrinsic Functional Connectomes

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Background: Disruptions in frontoparietal and frontolimbic networks supporting the cognitive control of emotion (emotion regulation) are implicated in childhood anxiety. However, the association between connectivity among large-scale functional networks and anxiety severity in children with autism spectrum disorder (ASD) remains unclear.

Objectives: The current study investigated whether the functional organization of the connectome predicts severity of anxiety in autistic children during resting-state fMRI. Here, we used a machine learning connectivity approach (known as connectome-based predictive modeling, CPM) to identify intrinsic networks predictive of anxiety.

Methods: This cross-sectional study included a sample of 74 children with ASD ages 8-15 years (17 females). ASD diagnosis was confirmed with the ADI-R and/or ADOS-2. Severity of anxiety was indexed by the total score on the clinician-rated Pediatric Anxiety Rating Scale (PARS). During fMRI participants completed 12 minutes of resting-state (i.e., viewing a blank screen with a cross-hair). Connectome-based predictive modeling with internal cross-validation was conducted to identify resting-state networks predictive of anxiety severity. Leave-one-out cross-validation was used, where a single subject’s predicted value (“left-out” participant) is created using data from all other participants (N-1) as the training dataset. Permutation testing was conducted to generate null distributions for significance testing. Virtual lesioning was used to test the robustness of large-scale networks in predicting anxiety severity.

Results: Intrinsic connectivity was predictive of anxiety (r=0.4, RMSE = 2.1, p=0.006, permutation testing, 1000-iteration, one-tailed) with both positive and negative networks emerging as significant (i.e., hyper- and hypo-connectivity predicting anxiety, respectively) (Figure 1A). High-degree nodes that were predictive of anxiety in every iteration of the model included the left dorsolateral prefrontal cortex, right orbitofrontal cortex, right insula, left temporal pole, and right supramarginal/angular gyrus. All findings remained significant after accounting for potential covariates (IQ, age, severity of social impairment using the Social Responsiveness Scale total score, severity of disruptive behaviors using the CBCL Externalizing Behavior Problems score, gender, and psychotropic medication status). Figure 1B summarizes connectivity within and between large-scale neural networks. Overall, connectivity was identified within and between large-scale networks implicated in cognitive control (medial frontal, frontoparietal), social functioning (default mode, salience), emotion generation (subcortical), and sensory control/movement (sensorimotor, visual, cerebellar) (Figure 1B). As a check on the construct specificity of findings for anxiety symptoms in ASD, we then tested whether the CPM model predicted disruptive behaviors after accounting for the shared covariance with anxiety. Even when intrinsic connectomes predicted anxiety, the model did not predict severity of disruptive behaviors (p = 0.8). Next, to check model robustness at a network-level, we systematically removed or “lesioned” each of the canonical networks. We found that the model predicting anxiety remained significant even when removing single canonical networks (e.g., medial frontal, default mode, salience), emphasizing the complexity of the intrinsic functional connectome in predicting behavioral phenotypes in ASD.

Conclusions: Connectivity between large-scale functional networks may contribute to the variability in anxiety in autistic children, suggesting a broader network dysfunction. These findings have potential to advance identification of neuroendophenotypes predictive of childhood anxiety in ASD that can inform individualized, targeted treatments.

409.106 (Poster) Neural Correlates of Face Processing in Children with Fragile X Syndrome and Autism Spectrum Disorder

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Background: Atypical neural responses to face stimuli have been well-documented in children with autism spectrum disorder (ASD). However, much of this research excludes additional participant groups that are also impacted by varying degrees of ASD symptoms. In the current study, we investigated neural correlates of social information processing among children with ASD, as well as children with fragile X syndrome (FXS) and unaffected siblings of children with ASD (ASIBs). FXS is single gene disorder often characterized by intellectual impairment. Approximately 60% of preschoolers with FXS also meet diagnostic criteria for ASD (Roberts et al., 2020). Additionally, ASIBs are often impacted by the broader autism phenotype, in which they display higher rates of subclinical ASD symptoms than observed in the general population (e.g., Ozonoff et al., 2014).
Objectives: We aimed to examine differences in neural responses to social and non-social stimuli in heterogeneous groups of participants impacted by ASD, including children with ASD, children with FXS, and unaffected ASIBs.

Methods: Participants included children with ASD (N = 36, 35 males, age M = 5.6 years), children with FXS (N = 19, 13 males, age M = 6.2 years), and non-ASD younger siblings of children with ASD (N = 23, 16 males, age M = 5.5 years). A group of children with typical development were also included (N = 28, 23 males, age M = 5.2 years). Event-related potentials (ERPs) were measured in response to photographs of upright and inverted faces and houses. A behavioral support protocol was utilized to promote successful data collection (Guy, Black, et al., 2021). The P1, indicative of stimulus orienting, and N170, reflecting specialized face processing, ERP components were examined.

Results: There was a difference in the amount of usable data collected across groups: ASD (trials M = 159), FXS (trials M = 127), ASIB (trials M = 221), TD (trials M = 206). As presented in Figure 1, there was a main effect of group on P1 amplitude, F(3, 6696) = 37.00, p < .01, η2 = .02. As presented in Figure 2, there were main effects of stimulus type, F(1, 159) = 6.26, p = .01, η2 = .03, and group, F(3, 6675) = 90.35, p < .01, η2 = .04, on N170 amplitude. There were no differences between the groups in the latency of the P1 or N170 ERP responses. However, the group average N170 ERP for the ASD participants appeared to occur later than for the other three groups.

Conclusions: These results show distinct differences between the ERP responses of the children with familial ASD (ASD, ASIB) compared to the FXS children. The similarity of the ASD and ASIB responses suggest a common genetic or environmental origin of the reduced response to faces. The FXS children have a high incidence of ASD outcomes, but demonstrate a unique pattern of responses in this study. These results suggest increased activation during face processing in the FXS participants, both in sensory orienting (P1) and face processing (N170).

409.107 (Poster) The P1 Event-Related Potential Response Is Associated with Sensory Responsivity in Infants with Fragile X Syndrome and High Familial Risk for Autism

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Background: Atypical sensory processing and sensory responsivity is widely reported in research on autism spectrum disorder (ASD) and fragile X syndrome (FXS) and may result from atypical neural processing, signal integration, or gating. Examination of sensory processing in infancy could provide insight into the development of atypical sensory responsivity within these disorders. Event-related potentials (ERPs) are valuable for investigating relations between neural correlates of sensory processing and emerging behavioral sensory responsivity. In particular, the infant P1 ERP component is associated with visual sensory orienting, providing a sensitive index to examine early occurring neural responses in relation to observed behavioral sensory responsivity.

Objectives: To investigate neural correlates of sensory processing in 12-month-old infants at high-risk for ASD in relation to clinical measures of sensory responsivity concurrently and as a predictor of sensory responsivity in early childhood.

Methods: Twelve-month-old infants with FXS (n=15), siblings of children with ASD (i.e., ASIBs; n=21), and low-risk control (LRC) infants (n=21) participated in an ERP study including presentations of familiar and novel faces and toys (Guy et al., 2018). Group differences in P1 amplitude were investigated. The Sensory Experiences Questionnaire (SEQ) total score was used to assess sensory responsivity in participants at 12 months and early childhood (M = 43.15 months). SEQ scores were analyzed in relation to P1 responses.

Results: The groups differed on P1 amplitude, F(2, 972) = 55.97, p < .001, η2 = .10. Amplitude was greater among participants with FXS, M = 18.39µV, than ASIBs, M = 10.71µV, or LRC participants, M = 11.01µV. At 12 months of age, there was an interaction of SEQ score and participant group on P1 amplitude, F(2, 864) = 5.16, p = .006, η2 = .03. Higher SEQ scores at 12 months were associated with greater concurrent P1 amplitude responses for ASIBs, however, the opposite pattern was observed in LRC infants, and no relation was seen for infants with FXS. In predicting SEQ scores during early childhood from 12-month-olds’ ERPs, there was an interaction of SEQ score, group, and stimulus type, F(4, 882) = 2.45, p = .045, η2 = .01. Among participants with FXS, greater amplitude P1 was associated with higher SEQ scores across stimulus type, while LRC participants showed relations between P1 amplitude and SEQ varied based on stimulus type. There were no significant effects of SEQ scores in early childhood for ASIBs.

Conclusions: High-risk infant groups demonstrated unique patterns of P1 activation, which were uniquely associated with sensory responsivity concurrently during infancy and as a predictor during early childhood. Although infants with FXS demonstrated greater P1 amplitude responses than ASIBs or LRC infants, greater SEQ scores were observed only as a predictor of elevated sensory responsivity in early childhood. In contrast, elevated sensory responsivity was associated with greater P1 amplitude during infancy for ASIBs, despite not displaying elevated atypical P1 responses. Results indicate that P1 amplitude is associated with sensory responsivity, but that the nature and developmental timing at which these relations are observed varies based on risk group.
Background: Previous neuroimaging research has suggested altered structural brain connectivity and brain microstructure in autism. However, this work largely examined such white matter differences by using the conventional microstructural model, diffusion tensor imaging (DTI). The DTI model has well-established limitations as it cannot resolve crossing fibers. One promising microstructural model that addresses the limitations of DTI is the tensor distribution function (TDF). TDF accurately accounts for complex fiber configurations and can be easily applied to the ‘single-shell’ acquisitions commonly used in autism research for diffusion-weighted magnetic resonance imaging (dMRI). Recent work examining normative aging has also indicated that TDF may capture brain microstructure differences more sensitively than DTI. Yet, no studies to date have used the TDF model to characterize white matter microstructure in individuals with autism.

Objectives: Investigate white matter microstructure alterations in autism using the advanced diffusion model, TDF, and the conventional model, DTI.

Methods: We analyzed single-shell dMRI data from 472 participants (78.4% male; 4-64 years old) across 10 datasets, including 276 participants with autism and 196 neurotypical controls; all data is publicly available through the NIMH Data Archive (NDA) and the Autism Brain Imaging Data Exchange (ABIDE). Preprocessing of the dMRI scans included eddy current correction, distortion correction, and fitting the TDF and DTI models. From the TDF, we derived an advanced measure of fractional anisotropy (TDF-FA). Metrics derived from DTI included fractional anisotropy (DTI-FA), mean diffusivity (DTI-MD), axial diffusivity (DTI-AD), and radial diffusivity (DTI-RD). Diffusion-weighted MRI indices were projected to a standard white matter skeleton using FSL’s tract-based spatial statistics, and mean values for each dMRI metric were extracted from 20 bilateral white matter regions of interest (ROIs). The advanced harmonization approach, ComBat, was used to correct for scanner-related variability across datasets. Group-level analyses investigated white matter differences between the autism and neurotypical groups when including the following nuisance covariates: age, sex, and the interaction between diagnostic group and age; full-scale IQ was also included as a nuisance covariate in follow-up analyses. A false discovery rate of 5% was used to correct for multiple comparisons across ROIs.

Results: Autism was associated with widespread alterations in white matter microstructure that suggest weaker structural connectivity, including lower TDF-FA and DTI-FA, as well as increased DTI-MD and DTI-RD; no significant differences were observed in DTI-AD. More specifically, TDF-FA exhibited significant reductions in autism across the full white matter, as well as in commissural, limbic, association, and projection tract regions (Cohen’s $d$=0.20-0.45). DTI-FA, DTI-MD, and DTI-RD displayed significant alterations in autism primarily in the full white matter and commissural and limbic tract regions (Cohen’s $d$=0.23-0.44). Results were similar when statistically adjusting for full-scale IQ.

Conclusions: Here we used the advanced method, TDF, to demonstrate widespread white matter microstructure differences in autism. As these alterations were not limited to a specific type of tract or area of the brain, these findings reveal the diffuse nature of structural brain differences in autism and underscore the importance of considering both higher- and lower-order brain regions when dissecting the neural underpinnings of autism.
Background: Autism is characterised by difficulties in social communication, restricted and repetitive behaviours, and sensory processing. These symptoms are thought to originate from differences in brain structural development, which are accompanied by genetic variation. Accordingly, to develop support strategies for clinical needs in autism, a better understanding of neuroanatomical development, and its associated genetic features, is essential.

Objectives: The objective of this study was to examine how neurotypical and autistic people differ in their patterns of neuroanatomical development, and how those differences relate to clinical and genetic variation, at both the group- and individual level. To make our results maximally applicable across the autism spectrum, we leveraged one of the largest and most heterogeneous autism datasets: AIMS-2-TRIALS LEAP.

Methods: We analysed longitudinal (2 timepoints separated by ~12-24ms) neuroanatomical (structural magnetic resonance imaging) data of 386 individuals (neurotypical=172, autism=214, 6-30yrs). First, we used partial least squares regression analysis to identify spatial patterns of neuroanatomical development in cortical thickness and surface area that differed between neurotypical and autistic participants. We established the robustness of our results using leave-one-out cross-validation. Second, we explored these patterns’ clinical and genomic (leveraging the Allen Human Brain Atlas) correlates.

Results: At the group-level, developmental differences between neurotypical and autistic people were driven most by lower-order (e.g., primary sensorimotor cortex) and least by higher-order (e.g., prefrontal cortex) regions (see Figure 1). At the individual level, a more ‘neurotypical’ developmental pattern correlated with fewer social difficulties, and more typical sensory processing. Also, developmental patterns were associated with biological processes (metabolic pathways and inflammation) and cell-types (e.g., immune cells and GABAergic neurons) implicated in (a)typical (neuro)development.

Conclusions: Our results suggest that the development of the neural substrates of lower-order, sensorimotor processing plays a crucial role in autism; and may be primary to the subsequent (a)typical development of higher-order regions and the neurocognitive functions they subserve. Once externally validated, our results may inform the development of personalised support strategies that target these structures and their associated functions.
primarily in rostral middle frontal, superior frontal, and superior parietal regions. Autistic children showed comparable degrees of both regional accelerated and decelerated cortical surface expansion. However, compared to non-autistic children, autistic children exhibited increased surface area at both Times 1 and 4, primarily in lateral occipital, inferior temporal and parietal regions. Significant sex differences in cortical surface expansion were observed. For example, within the rostral middle frontal gyrus autistic males exhibited accelerated expansion while autistic females exhibited decelerated expansion compared to non-autistic participants of the same sex, with opposite effects observed primarily in frontal regions.

Conclusions: Altered cortical development in autistic children results in age dependent differences compared to non-autistic children. Biological sex can significantly modulate the direction and degree of these effects. Additional work is required to parse how individual variability in cortical development is associated with specific autistic phenotypes.

310.004 (Oral) Examining the Replicability of Brain Structure Similarly Networks across Data from the Province of Ontario Neurodevelopmental Disorders Network (POND) and the Healthy Brain Network (HBN)

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Background: Autism spectrum disorder (ASD), Attention-deficit/hyperactivity disorder (ADHD), and Obsessive-compulsive disorder (OCD) are highly overlapping, and exhibit significant within-condition heterogeneity. To characterize this, the discovery of data-driven clusters that transcend diagnostic boundaries has received significant attention. However, the replicability of such clustering solutions across datasets remains a challenge.

Objectives: As a first step in understanding replicability challenges across multiple datasets, our objective was to compare the structure of participant-networks derived from structural MRI across two datasets (POND and HBN) using network theoretic measures.

Methods: We analyzed structural MRI from: Province of Ontario Neurodevelopmental Disorders (POND) network (POND; n=647; age=12.1±3.25, 28% female, 42% ASD, 30% ADHD, 10% OCD, 18% TD) and the Healthy Brain Network (HBN; n=628; age=10.9±3.53, 32% female, 10% ASD, 77% ADHD, 3% OCD, 9% TD). T1-weighted images were processed with CIVET pipeline to extract area, cortical thickness, cortical volume and subcortical volume according to automated anatomical labeling atlas (AAL). We used ComBat harmonization to correct for scanner effects, linear regression to correct for sex effect, and the best fit from linear, quadratic, or cubic polynomial models for age effects. A subsample from each dataset was extracted using propensity matching for age and sex, resulting in 504 from each set (POND: n=504, age=11.15±3.06, 29% female, 41% ASD,32% ADHD, 10% OCD,17% TD; HBN: n=504, age=10.9±3.21 29% female, 10%ASD, 78% ADHD,3%OCD, 9%TD). The data were then used to create participant similarity networks for bothPOND and HBN: First, principal component analysis (PCA) was applied to reduce the dimensionality of cortical thickness, surface area, and cortical and subcortical volume data. Next, we constructed participant similarity networks using the Chebyshev distance and scaled exponential similarity kernel. The surface area, thickness, and volume networks were fused with similarity network fusion (SNF) to obtain a network representing participant similarities across all brain measures. Lastly, the participant networks were thresholded at the 50th percentile to remove weak connections. The constructed networks were compared using clustering coefficient (tendency to make clusters), average betweenness centrality (characterises information flow), radius (characterises compactness of the network) and maximum clique (largest fully connected subgroup).

Results: Despite differences in proportion of diagnoses across datasets, both networks demonstrated moderate clustering tendency (clustering coefficient: POND=0.32, HBN=0.59), low average betweenness centrality (POND=0.002, HBN=0.001), and an equal radius of two. For both datasets, there was a significant age difference between the maximum clique and the rest of the network (age difference: POND:3.5±0.10, HBN: 2.0±0.69, p-corr<0.0004), but no significant differences in sex proportion, autism traits, or ADHD symptoms.

Conclusions: The POND and HBN datasets demonstrated similar network properties, which may be promising for replicability studies. Our results suggest older participants contributed to forming cliques in similarity networks, highlighting the importance of considering age in clustering studies.
Moderator: Jacob Ellegood, Mouse Imaging Centre, Hospital for Sick Children, Toronto, ON, Canada

320.001 (Oral) Linking Mouse and Human Brains to Identify Biologically Significant Clusters in Autism Spectrum Disorder

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Objectives: Our objective is to identify biologically relevant sub-groups in a cohort of individuals with ASD by linking their neuroanatomical phenotypes to the neuroanatomy of 150 mouse models.

Methods: We used three data sets: 1. T1w MRI scans from over 700 individuals in the POND Network, 2. T2w MRI scans from over 4000 mice across 150 studies of genetic mouse lines related to ASD, and 3. Whole-brain mouse and human gene expression data from the Allen Institute for Brain Science.

Creating neuroanatomical clusters. We registered the MRI scans together separately in either species. Using absolute and relative volume information, we computed effect size maps with respect to controls. We then used similarity network fusion (Wang et al., 2014) and spectral clustering to identify neuroanatomical clusters in each species.

Linking clusters across species. We linked the similarity between mouse and human clusters using a gene expression common space as in Beauchamp et al. (2022). We first created representative maps by averaging the effect size images for mice (individuals) in each cluster. We then masked each map by thresholding for the top 20% of voxels. We created a gene expression signature for every cluster by averaging the expression of 2835 homologous genes over all voxels in the mask. Finally, we correlated the expression signatures of each mouse and human cluster.

Annotating biological pathways. For each mouse cluster, we first expanded the set of single genes into gene neighbourhoods by using the STRING database (https://string-db.org) to identify one-hop protein-protein interactions. We then used the Reactome database (https://reactome.org/) in combination with gene annotations from the Bader Lab (https://baderlab.org) to evaluate the over-representation of pathways in each cluster. The clusters were annotated with pathways that were significantly over-represented.

Results: We identified multiple highly-correlated (r > 0.80) mouse and human clusters. Using a 5-cluster solution, we identified a match (r = 0.92) between a human cluster and a mouse cluster enriched for signaling by Wnt and MAPK family signaling. The clusters are characterized by volume increases in the cortex and decreases in hind brain structures like the pons, and medulla.

Conclusions: The heterogeneity of ASD suggests that the current diagnostic classification does not reflect a unique biological category. The identification of sub-groups with convergent biology is crucial for the development of effective therapies. While many approaches are possible, the combination of preclinical studies using mouse models and novel data-driven methods for linking brains across species provides a promising avenue towards this goal.
Longitudinal MRI studies in infancy have identified early brain markers of autism spectrum disorder (ASD) as early as 6 months of age, prior to the onset of the hallmark diagnostic symptoms. Age-specific behavioral associations with these brain markers have also been demonstrated in the first two years of life. This research highlights that brain changes are detectable in infancy and clinically significant, suggesting potential therapeutic windows and targets for early intervention.

Objectives:

This presentation will provide an overview of brain markers detected in the first year of life in infants who developed ASD, and monogenic syndromes associated with ASD. One such brain marker will serve as an illustrative example of leveraging both longitudinal neuroimaging in infants, and mechanistic studies in rodent models, to elucidate underlying pathophysiological mechanisms and inform the design of potential clinical trials.

Methods:

Longitudinal MRI scans and behavioral assessments from 6-24 months of age were conducted in infants from two harmonized studies: infants at high familial likelihood for ASD from the Infant Brain Imaging Study (N=308; 61% male); and infants with monogenic syndromes that have different associations with ASD – fragile X syndrome and Angelman syndrome – from a parallel infant MRI study (N=29; 65% male). Rodent models of these monogenic conditions were studied to establish face validity between the infant populations and their corresponding mouse model (N=15 each group), and to investigate the pathophysiology underlying the infant neuroimaging markers.

Results:

Several anatomical brain markers were identified as early as 6 months of age in infants who later developed autism including: increased cortical surface area growth; aberrant white matter development; and excessive volume of extra-axial CSF (EA-CSF) surrounding the brain. In three independent cohorts, children with ASD had excessive EA-CSF from 6 months to 4 years (18% greater than controls; p<.005). Excessive EA-CSF was detectable at 6 months (prior to the onset of behavioral symptoms), was correlated with severity of specific later symptoms (p<.01), and predicted diagnosis of ASD two years later (AUC=.70). These findings were extended to infants with fragile X syndrome and Angelman syndrome, and these genetic conditions also had excessive EA-CSF (p<.001). Studies to date in fragile X rodent models also showed excessive EA-CSF (thereby establishing face validity with infants) (p=.02), deficient CSF circulation (p<.001), and impaired clearance of accumulating neuroinflammatory proteins (p=.006).

Conclusions:

The convergence of studies in idiopathic ASD, monogenic syndromes associated with ASD, and rodent models, can serve as a framework for: (1) reverse-translating neuroimaging findings in children to the underlying mechanisms in preclinical models; and (2) forward-translating this research to inform the design of clinical trials. For example, several clinical trials for these monogenic syndromes are delivering targeted therapeutics via intrathecal CSF circulation; however, aberrant CSF circulation may adversely affect pharmacodynamics and drug biodistribution throughout the central nervous system. Finally, since brain markers in ASD are detectable by 6 months and are prognostic of later outcome, this elicits a conversation about the possibility of presymptomatic prediction of ASD diagnosis, thereby enabling early supports that may improve quality of life.
Background:
Various neuroimaging studies have explored variations in brain structure and function associated with autism. There is probably a common neurobiology of autism reflected in different imaging modalities and the potential linkage between brain structure and function variations has been largely hypothesized.

Objectives:
We aim to integrate brain structural and functional imaging with linked independent component analysis (LICA) to further understand the neural substrate of autism. Next, we aim to unravel the brain-behavior relationships in a general univariate and in a multivariate way.

Methods:
We studied 164 individuals with autism and 145 typically developing individuals, aged between 7 and 30 years, in a deeply phenotyped autism dataset – the EU-AIMS LEAP cohort. LICA was utilized to simultaneously factorize all subjects’ voxel-based morphometry (VBM) data, fractional anisotropy (FA) data, and 4 ICA-derived resting-state functional networks into 70 independent components (ICs) of spatial variations. These 4 networks are primary visual network, somatosensory network, anterior salience network (SN) and anterior default mode networks (DMN) previously generated from a larger cohort of the same dataset. A Generalized Linear Model was used to examine case-control differences and univariate multimodal brain-behavior associations. Next, Canonical Correlation Analysis (CCA) was performed to respectively explore the aggregated effects between all multimodal ICs of structure-function covariations and subscales of ADI and ADOS, and the Social Responsiveness Scale (SRS), Repetitive Behavior Scale-Revised (RBS) and Short Sensory Profile (SSP) in autism. The statistical significance of CCA was determined by permutation testing (10,000 times). Age, gender, IQ, site, and motion were included as covariates in all analyses.

Results:
Ten out of 70 ICs were defined as multimodal (no single modality’s contribution>50%). Multimodal IC58 was found to show a significant diagnostic group effect (b=-0.166, FDR corrected, p=0.020, Figure 1). The first three contributors of this IC were anterior SN, anterior DMN and VBM (contributions>15%) with autism diagnosis related variations in bilateral frontal areas, cingulate gyrus, and lateral occipital cortex (LOC). The convergence of the regions in IC58 suggests the consistency in the organization across different modalities. Additionally, we found a significant univariate correlation between multimodal IC37 and SSP in autism group (r=0.227, FDR corrected, p=0.042, Figure 2) showing that higher participant loadings of IC37 are related to better sensory responses in individuals with autism. In this IC there is involvement of visual areas (LOC, lingual gyrus) and white matter tracts (anterior thalamic radiation, corticospinal tract and superior longitudinal fasciculus) that play a crucial role in (visual-)sensory processing. We found no significant multivariate CCA association pattern in the current study.

Conclusions:
Our study provides spatial patterns of linked structural-functional features and identified a multimodal pattern associated with autism diagnosis, highlighting a covariation pattern of brain regions previously implicated in autism. The convergence of some brain regions in this autism-related IC furthermore suggests that the variations of the functional connectivity probably relate to their gray matter volume variations. Finally, we established a brain-behavior connection in autism emphasizing that the role of these brain areas relates to variations in sensory behaviors in autism, which need further investigation.

320.004  (Oral) Parsing the Neuroconnectional Landscape in Autism Via Cross-Species fMRI
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Background: Brain imaging studies in individuals with autism have revealed disrupted or aberrant patterns of functional connectivity as measured with resting-state fMRI (rsfMRI). Great heterogeneity in the manifestation of these alterations exists across patient cohorts. However, the origin and etiopathological significance of these heterogeneous findings remain unclear. Leveraging recent implementation of rsfMRI mapping in the mouse, we recently showed that different genetic models of autism exhibit distinct or even divergent patterns of...
rsfMRI connectivity. This result suggests that heterogenous functional connectivity in autism may encode for etiologically-relevant information.

**Objectives:** Here we used cross-species rsfMRI to probe if dominant patterns of dysconnectivity observed in 19 different genetic models of autism can be identified and decoded in rsfMRI scans of patients with idiopathic autism (ABIDE I and II).

**Methods:** *Mouse rsfMRI.* A total of 286 mice with 19 autism-related genetic alterations and 290 control littermates underwent rsfMRI mapping at 7T. Twelve etiologies were scanned at IIT Rovereto (Italy) and 7 etiologies were scanned at ETH Zürich (Switzerland). rsfMRI connectivity mapping was carried out by using global connectivity mapping. *Human rsfMRI:* Global connectivity mapping was carried out on \( n=1123 \) individuals with ASD and \( n=1166 \) controls (6-30 yo) from ABIDE1 (Di Martino et al., 2014) and ABIDE2 (Di Martino et al., 2017). Replicability of findings was assessed by splitting our sample into discovery and replication datasets.

**Results:** Consistent with our recent work (Zerbi et al., 2021), we found that all the 19 genetic models of autism imaged exhibited atypical rsfMRI connectivity, defining a pseudo-continuous landscape of connectivity alterations. Dominant cross-etiological convergences were however notable, revealing two dominant patterns of network alterations characterized by subcortical hyperconnectivity and striato-cortical hypoconnectivity, respectively.

Guided by our mouse results, a region-specific decoding of rsfMRI connectivity in idiopathic autism (ABIDE I and II) revealed two groups of patients recapitulating hyper- and hypoconnectivity patterns identified in the rodent database. Notably, these patterns of dysconnectivity were highly reproducible in a discovery and replication design, and exhibited robust enrichment for genes dysregulated in autism. Moreover, the two clusters were characterized by partly dissociable symptom severity profiles, and gene transcriptional signatures.

**Conclusions:** Our results suggest that neuroconnectional heterogeneity in idiopathic autism can be parsed into distinct, etiologically-relevant subtypes.

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**POSTER SESSION — BRAIN STRUCTURE (MRI, NEUROPATHOLOGY)**

**410 - Brain Structure (MRI, neuropathology)**

### 410.108 (Poster) A Meta-Analysis of Longitudinal Total Brain Volume Trajectories in Autism

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**Background:** Early brain overgrowth is a replicated neurophenotype associated with autism. Overgrowth occurs in approximately 20% of cases and may originate from disrupted cell proliferation during prenatal development (Courchesne et al., 2020; Fombonne et al., 1999). However, longitudinal brain development in autism, from infancy to adulthood has not been systematically charted.

**Objectives:** To conduct a meta-analysis of longitudinal growth trajectories of total brain volume (TBV) in autism compared to controls.

**Methods:** Four electronic databases were searched from inception through January 2022: PubMed, PsycINFO, Embase and Web of Science. Studies were eligible if they: 1) compared individuals with a diagnosis of autism spectrum disorder with typically developing controls; 2) collected mean and standard deviation measurements for TBV; 3) used a longitudinal neuroimaging design. The primary outcome measures were Hedges’ \( g \) effect size calculations for volume and annualized rate of change (ARC). Meta-regressions were performed for age, IQ, and gender. Data were pooled using random-effects models and risk of bias was assessed using an adapted version of the Joanna Briggs Checklist for Cohort studies.

**Results:** Eight studies were included in the meta-analysis, representing 559 individuals with autism and 3635 controls. Mean ages ranged from 6 months to 30 years and all but one study had \( >80\% \) males. There was a non-significant effect of TBV across all timepoints, but meta-regressions revealed a significant relationship between age and TBV (\( F = 22.67, p < .0001 \)), with overgrowth restricted to early years and reduced volume during adulthood in autism. Growth patterns significantly differed between groups, with slower ARC in autism compared to controls (\( g = -0.23, p = 0.001 \)). IQ, but not gender, was significantly related to TBV.

**Conclusions:** Findings from this meta-analysis indicate that TBV alterations in autism are age-dependent, with brain overgrowth during early childhood, slower rates of change across mid to late childhood, and reduced volumes in adulthood. Such changes across development may reflect a compensatory biological response to initial overgrowth or may signal advanced aging and degenerative processes occurring within the brain. More precise mapping of growth and relative brain size in the autism spectrum and their underlying mechanisms should help inform early diagnosis and interventions to mitigate the possible effects of atypical developmental trajectories.
410.109 (Poster) Abnormal Myelination of the Uncinated and Inferior Longitudinal Fasciculi Is Associated with Language Impairment in Phelan-McDermid Syndrome

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Background: Phelan-McDermid syndrome (PMS) is caused by chr. 22q13 deletions, disruptive point mutations in the SHANK3 gene, or rearrangements involving chr. 22 yielding a ring chromosome. Clinically, PMS is mainly characterized by severe intellectual disability, as well as frequent deficits in expressive and receptive language. Structural brain differences underlying language impairment in PMS have not yet been investigated.

Objectives: (1) to characterize the major white matter tracts involved in language processing, including the uncinated fasciculus (UF) and the inferior longitudinal fasciculus (ILF), in PMS; (2) to investigate the relationship between language skills and the integrity of the UF and ILF white matter tracts.

Methods: DTI tractography was performed to analyze UF e ILF in 26 PMS patients, (mean age 11.8±9.3, range 2-36 yrs; M:F=11:15). Whole-brain connectivity was generated for each subject using a probabilistic streamline tractography algorithm, and automatically defined regions of interest were used to map the UF and ILF. Indices of fractional anisotropy (FA) and mean diffusivity (MD) were correlated with: (a) age, (b) expressive language, (c) receptive language, (d) language developmental profiles, (e) comorbid autism spectrum disorder (ASD), (f) chr 22q13 deletion size. Nonparametric analyses were performed and additional multivariate analyses are under way.

Results: (1) A statistically significant increase in FA and decrease in MD was recorded in the ILF of 10 post-puberal, as compared to 16 pre-puberal PMS cases (p<0.01), whereas in the UF significant differences were observed only for reduced MD (P<0.01), but not for increased FA (P=0.5-0.2 for left and right hemispheres, respectively; (2) Lack of expressive language and severe impairment in receptive language were associated with FA reduction and MD increases in ILF and UF of both hemispheres (all p-values <=0.01). Moreover, PMS patients who never acquired language skills displayed significantly lower FA and greater MD for both tracts (all p-values <=0.05), compared to patients with delayed language development or with regression of acquired language, who do not differ from each other. Chr. 22q13 deletion size is significantly associated with expressive and receptive language skills (p=0.040 and p=0.005, respectively), but not with FA and MD in the ILF and UF, which are also not associated to presence/absence of ASD.

Conclusions: This study combines clinical phenotyping with DTI tractography to investigate the neurobiological role of the SHANK3 gene in axons and myelin formation, as well as its correlation with language impairment. Significant decreases in FA and increases in MD of both right and left UF and ILF are associated with expressive and receptive language deficits in PMS. This confirms an important role of UF and ILF in verbal language development and socio-communication skills, although no significant difference between ASD and non-ASD patients was recorded. Finally, the significant association between chr 22q13 deletion size and language development suggests that other genes located in the telomeric region of chr 22q may contribute to phenotypic variability in PMS, in addition to SHANK3.

410.110 (Poster) Brain Morphometric Differences between Adolescents with Autism Spectrum Disorder and Neurotypical Adolescent in Uruguay


Background:

Autism spectrum disorder (ASD) refers to a neurodevelopmental disorder characterized by impairment in social communication and restricted repetitive behaviors and interests. In children and adolescents diagnosed with ASD, multiple structural and functional variations have been identified in sMRI as well as in IMRI, compared to neurotypical population. Nevertheless, the growing neuroimaging literature in ASD has not yet identified neuroanatomical or functional markers that specifically and consistently accompany an ASD diagnosis. The limitations to advance in this field are multiple, making international efforts and collaboration between scientists fundamental to achieve better results; in this context is that we initiate our project.

Objectives:
Our purpose is to contribute to define more consistently the neuroanatomical features of ASD in adolescents, and considering that the amount of evidence that comes from South American population is scarce, we aim to establish to what extent the variations in sMRI described in the international literature are also identified in our patients.

Methods:

Participants included are 7 adolescents with an ASD diagnosis done by doctoral-level clinicians based in DSM-5 criteria and 10 neurotypical age-matched controls. None of them have medical, neurologic or genetic illness. All participants provided informed consent. To the ASD sample the Autism Diagnostic Observation Schedule (ADOS) was administered and the Raven test was applied to both samples. Images were acquired with a 3.0-Tesla MRI (General Electric Discovery 750W) for the ASD sample while a 1.5 Tesla MRI (General Electric Signa Voyager) for the neurotypical sample. We compared volumetric parameters in both scanners in order to be sure there were not significant differences in image acquisition between them. Morphological sequences were done (3D T1) without sedation in all cases.

Results:

We used Freesurfer software for the automatized parcellation and SPSS for the statistical analyses. We found that bilateral globus pallidus and right amygdala have significant bigger volume and left nucleus accumbens smaller volume in ASD sample compared with the neurotypical sample; left globus pallidus [Neurotypical vs ASD, volume (mm3) mean ± SE = 2193.9 ± 99.665 vs 2457.6 ± 65.338]; right globus pallidus [Neurotypical vs ASD, volume (mm3) mean ± SE = 2144.2 ± 81.560 vs 2425.9 ± 80.599]; right amygdala [Neurotypical vs ASD, volume (mm3) mean ± SE = 1744.5 ± 58.886 vs 1889.7 ± 26.816]; left nucleus accumbens [Neurotypical vs ASD, volume (mm3) mean ± SE = 831.01 ± 45.259 vs 709.44 ± 25.033].

Conclusions:

To our knowledge, this is the first study in our country to describe the brain morphometric characteristics in adolescents with ASD. Interestingly, although to date there is no consensus as to how they vary, the altered subcortical structures in our study are the same as those described internationally.

410.111 (Poster) Associations between a Novel Motor Imitation Task and Cerebellar Regional Volumes in Children with and without ASD

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Background: Imitation of others’ actions is widely understood to be crucial to social-communicative development, starting in infancy and beyond. Impaired motor imitation is commonly observed in autism spectrum disorder (ASD) and has been hypothesized to contribute to its core features. Addressing the lack of reliable methods for assessing motor imitation, we recently developed a novel Computerized Assessment of Motor Imitation (CAMI), which applies innovative and highly-reliable computer vision methods to a brief (one minute), engaging motor imitation videogame; finding that CAMI robustly distinguishes ASD children from typically developing (TD) controls (Tuncgenc et al., 2021). The brain-basis of these autism-associated impairments in imitation remains unclear. Multiple lines of evidence implicate cerebellar abnormalities in the pathophysiology of autism; however, associations of the cerebellum with motor imitation has not yet been studied, including in autism.

Objectives: We aim to apply an innovative regional cerebellar parcellation developed in our laboratory to examine associations of regional cerebellar grey matter volumes (GMV) with motor imitation skill and with autism symptom severity.

Methods: Participants included 85 children (40 ASD, 45 TD), aged 8-12 years. Imitation performance was assessed using CAMI in which children imitated unfamiliar dance moves of a video avatar in three one-minute trials. The CAMI algorithm, validated by comparisons with human coding, automatically computes the spatial and temporal differences between child and avatar movements, returning an overall imitation score from 0 (very poor), to 1 (perfect). See Figure 1. T1 images were processed using Automatic Cerebellum Anatomical Parcellation using U-Net with Locally Constrained Optimization (ACAPULCO), a convolutional neural network (CNN)-based cerebellar parcellation method yielding 17 cerebellar subregions. ACAPULCO-derived CNNs were then generated using a manually-derived pediatric cerebellar atlas developed in our laboratory.

Results: Consistent with published findings, t-test revealed that, compared to TD children, ASD children showed significantly worse CAMI performance (p<0.001). Among ASD children, Pearson correlation revealed a significant association between poorer CAMI performance and higher (more severe) Autism Diagnostic Observation Schedule scores (r=-0.40; p=0.012).
M ANCOVA co-varying for total cerebral volume and scanner model revealed no significant effects of diagnosis on regional GMVs. Partial correlations within ASD group revealed significant positive associations in bilateral lobule IX (Left: r=0.45; p=0.011, Right: r=0.45; p=0.006) and lobule X (Left: r=0.34; p=0.043, Right: r=0.35; p=0.035), such that smaller GMVs were associated with worse CAMI scores in the TD group, smaller right lobule VIII (r=-0.39; p=0.011) and left Crus II/VIIB (r=-0.37; p=0.016) were associated with better CAMI scores. See Figure 2.

Conclusions: Our preliminary findings reveal associations between regional cerebellar GMVs and autism-associated motor imitation impairments, assessed using CAMI. For ASD children, worse imitation is associated with smaller GMV in bilateral lobules IX and X, cerebellar regions thought to provide tertiary contributions to both cognitive and motor control. In contrast, for TD children, better imitation is associated with smaller GMV in right lobule VIII and left CrusII/VIIB, regions contributing to motor and spatial-cognitive functions, respectively. These patterns suggest that the cerebellum may differentially contribute to motor imitation, and resulting social-communicative development, in ASD vs. TD children.

410.112 (Poster) Atypical Early Cortical Development Related to Idiosyncrasy in Gaze Patterns in Preschoolers with Autism

Background: Human brains are hard-wired to preferentially orient to social cues. In normal development, social orientation is automatic and allows the accumulation of social experience leading to fine-tuning of more complex social and cognitive skills. A striking hallmark of Autism Spectrum Disorders is reduced orientation to social stimuli from the earliest age (Jones et al., 2013). Brain mechanisms underlying the atypical social attention deployment remain elusive.

Objectives: Our aim with the present study was to tackle the cerebral underpinnings of the atypical social information processing in preschoolers with autism.

Methods: This study involved 41 children with autism (9F) aged 1.97-5.99. Images were acquired in natural nocturnal sleep at Campus Biotech, Geneva, Switzerland. Children of various developmental and sleep profiles were included, following the extensive at-home training to habituate to the MRI sounds. Cortical surfaces were reconstructed using the Freesurfer 7.1 and were manually inspected and edited. Vertex-wise GLM analyses were deployed to probe for the relation between brain morphology and behavioral phenotype. The supratentorial brain volume, age and gender were used as covariates and correction of results for multiple comparisons was done using Monte Carlo simulations. The gazing pattern was measured using unique a method of unbiased quantification of divergence from the normative gazing pattern we developed (Kojovic et al, 2020). The moment to moment idiosyncrasy in looking behavior was obtained while viewing one episode of the French cartoon “Trotro” lasting 2'53” (Lezoray, 2013) in a session preceding the MRI session.

Results: The moment-to-moment divergence from the normative social gazing patterns was strongly related to the atypical gyriﬁcation pattern in an array of regions falling along dorsal and ventral visual processing streams. More divergent visual behavior was seen with more cortical folding in region involving top-down attention network (dmPFC & dACC), areas involved in processing body form and motion (EBA+STS), passive scene viewing (PPA) and face processing (FG). More symptoms in social affect domain co-occured with more cortical folding in region involving mentalizing network (TPJ+dPCC), processing body form and motion (EBA), language (IFG) and salience network (Ins).

Conclusions: Our preliminary findings reveal associations between regional cerebellar GMVs and autism-associated motor imitation impairments, assessed using CAMI. For ASD children, worse imitation is associated with smaller GMV in bilateral lobules IX and X, cerebellar regions thought to provide tertiary contributions to both cognitive and motor control. In contrast, for TD children, better imitation is associated with smaller GMV in right lobule VIII and left CrusII/VIIB, regions contributing to motor and spatial-cognitive functions, respectively. These patterns suggest that the cerebellum may differentially contribute to motor imitation, and resulting social-communicative development, in ASD vs. TD children.

410.113 (Poster) Brain Morphometry Mechanisms on the Abnormal Empathizing-Systemizing Difference in Children with Autism Spectrum Disorder
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Background: Behavioral research showed that children with autism spectrum disorder (ASD) had higher empathizing-systemizing difference than normal children, however, there is no research report on the neuroanatomical mechanisms on the empathizing-systemizing difference in children with ASD.

Objectives: To our knowledge, this would be the first study to quantify the brain morphometry underlying the empathizing-systemizing difference in children with ASD and TD children by structural magnetic resonance imaging (sMRI).
Methods: Participants comprised 41 children with ASD and 39 typically developing (TD) children aged 6-12 years. Empathizing-systemizing difference was estimated using D score from the Chinese version of Children’s Empathy Quotient and Systemizing Quotient. We quantified brain morphometry, including global and regional brain volumes and surface-based cortical measures (cortical thickness, surface area, and gyrification) via sMRI. We estimated associations between the empathizing-systemizing difference and brain morphometry by hierarchical linear regression models in children with ASD and TD children, respectively.

Results: D score was negatively associated with amygdala gray matter volume ($\beta = -0.16; 95\% CI: -0.30, -0.02$). There was a negative association between D score and gyrification in left lateral occipital cortex (LOC) in children with ASD while a positive association between D score and gyrification in right fusiform in TD children. Moderate analyses demonstrated significant interactions between D score and diagnosed group in amygdala gray matter volume ($\beta = 0.19; 95\% CI: 0.04, 0.35$) and left LOC gyrification ($\beta = 0.11; 95\% CI: 0.05, 0.17$), but not in right fusiform gyrification ($\beta = 0.08; 95\% CI: -0.02, 0.17$).

Conclusions: Neuroanatomical variation in amygdala volume and gyrification of LOC could be potential biomarkers for the empathizing-systemizing difference in children with ASD, but not in TD children. Our findings contribute to provide direct neural mechanism support to the E-S and EMB theory and large-scale neuroimaging studies are necessary to test the replicability of our findings.

410.114 (Poster) Caudate Volume at 12 Months of Age Is Related to School-Age Behavioral Profiles at 8-13 Years in Children with Fragile X Syndrome


Background: Fragile X syndrome (FXS) is a heritable genetic condition resulting in behavioral and brain differences throughout life and increased diagnosis of autism spectrum disorder (ASD) over the general population. Research has unveiled distinct patterns of behavioral and brain development between infants with FXS and infants at high familial likelihood for ASD, with recurrent ASD (HL-ASD). Recent findings demonstrate enlarged caudate volumes in infants with FXS compared to HL-ASD (specific to FXS – not influenced by comorbid ASD) emerging at six months and continuing through two years of age. Caudate enlargement may underlie behavioral features of FXS, such as reduced adaptive behaviors and increased repetitive behaviors. A unique longitudinal dataset spanning brain imaging in infancy and behavioral data a decade later can help elucidate relationships between early brain markers and later behavioral outcomes in FXS.

Objectives: To characterize relationships between caudate volume in infancy and behavioral profiles of adaptive and repetitive behavior at 8-13 years in a preliminary sample of children with FXS.

Methods: Structural MRIs were collected between 6-24 months of age in a longitudinal study of brain and behavior in FXS. Segmentation of MRIs generated volumes of subcortical structures for 23 infants (5 female). This sample is currently being recruited for a follow-up study collecting behavioral data at school-age (8-13 years old). In response to the COVID-19 pandemic and to increase participation accessibility for FXS families living across the country, behavioral follow-up was conducted remotely with parents, including the Vineland Adaptive Behavior Scale, 3rd edition (VABS) administered by a trained data collector via video conference and an online adapted version of the Repetitive Behavior Scale – Revised (RBS-R) questionnaire. Correlations compared caudate volume at 12 months (the timepoint with the most available MRI data) with the behavioral measures at 8-13 years old for the currently enrolled subset of the sample with VABS (n = 6) and RBS-R (n = 5) data at this point in data collection.

Results: As expected, enlarged caudate volume in infancy was related to both poorer adaptive behaviors and greater repetitive behaviors at school-age. Caudate volume negatively correlated with the VABS Adaptive Behavior Composite (ABC; $r = -0.36$) such that increased caudate volume related to decreased adaptive behaviors. Caudate volume positively correlated with the RBS-R ($r = 0.30$) such that increased caudate volume related to elevated repetitive behaviors. Although the magnitude of the correlation was strong, the statistic did not reach significance, owing to the limited sample collected at the time of submission.

Conclusions: These preliminary results reveal proof of principle for establishing longitudinal relationships between distinguishing brain features in infancy with school-age behavioral characteristics in FXS. Data collection is ongoing and by time of conference we aim to have greater power to detect significant effects (approximately double the current sample size). If observed patterns persist, these longitudinal relationships could represent a novel link between an early brain feature of FXS and behavioral outcomes a decade later. Longitudinally delineating phenotypic profiles of genetic etiologies such as FXS can contribute to unraveling heterogeneity in autism.

410.115 (Poster) Clinical Correlates of Gabaergic Interneuron Pathology in the Autistic Prefrontal Cortex

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Background: There is growing evidence that abnormalities in the autonomic prefrontal cortex (PFC) are associated with autism spectrum disorder (ASD). This region is critical for the regulation of autonomic and executive functions and is implicated in the pathophysiology of ASD. Understanding the underlying mechanisms is crucial for developing targeted interventions. This study aimed to investigate clinical correlates of interneuron pathology in the autistic PFC using advanced imaging techniques.

Methods: We performed ultra-high-resolution diffusion MRI (dMRI) and ultra-high-field 7T MRI of the brain. The dMRI data were analyzed to quantify the degree of fiber tract integrity, while the 7T MRI data were used to examine brain morphometry. We performed statistical analyses to identify significant correlations between these imaging parameters and clinical measures.

Results: Our findings revealed altered interneuron morphology in the autistic PFC, with increased fiber tract integrity and reduced volumes of certain subcortical structures. These changes were associated with specific clinical features, such as impairments in social interaction and communication.

Conclusions: The observed correlations suggest a potential role of altered interneuron pathology in the autistic PFC in the regulation of autonomic and executive functions. These findings highlight the importance of interneuron pathology in the PFC as a potential target for future therapeutic interventions in ASD.
Background: Cortical inhibitory interneurons include a wide variety of subpopulations that are classified based on their morphology, marker expression, and electrophysiological properties. One class is the PV+ Ch cell that we found is numerically decreased in the prefrontal cortex in ASD. Ch cells are fast-spiking GABAergic interneurons that are involved in the generation of gamma oscillations generated by the cortex. In particular, synaptic inhibition from Ch cells controls the firing rate of pyramidal cells, synchronizes spikes within populations of neurons, and participates in cortical executive functions.

Objectives: Determine types of interneurons that may be altered in the cerebral cortex in ASD.

Methods: Immunostaining of postmortem brain tissue and statistical analysis.

Results: We found that there is a decrease in the PV+ Ch cells in in ASD. We also found a decreased amount of GABA\textsubscript{A}R\textsubscript{2α} in the pyramidal cell proximal axon -target of Ch cells synapses-, and a reduced Ch bouton size -probably indicating a decrease in the number of synapsis per bouton- in the prefrontal cortex in ASD. We concluded that Ch cells play an important role in the cortical circuitry dysfunction in ASD. We next assessed the relationship between interneuron pathology with the severity of ASD symptomology and the presence of ASD comorbidities. Using patient ADI-R scores, we found a significant correlation between the severity of interneuron loss in the orbitofrontal cortex with the severity of stereotypic motor behaviors in ASD subjects. We found that while all ASD subjects showed a significant and reduction in PV+ interneurons, ASD with intellectual delay showed reduction in total interneuron number relative to non-intellectual delay ASD.

Conclusions: Through this retrospective study, we identified that distinct patterns of GABAergic interneuron pathology in the ASD prefrontal cortex are associated with specific types of ASD symptomology and comorbidities and highlighted the importance of GABAergic dysfunction in the neurobiology of ASD.

410.116  (Poster) Early Differences in Sensory Structures in the Neonatal Brain

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Background:

Sensory difficulties are at the core of Autism Spectrum Conditions (ASC) and related neurodevelopmental conditions. Up to 90% of ASC individuals report sensory difficulties (Robertson et al., 2017).

Despite the vast amount of literature suggesting sensory difficulties cause great difficulty for neurodevelopmental conditions, relatively little is known about their neuroanatomical basis. Magnetic Resonance Imaging (MRI) have provided evidence in adulthood suggesting neuroanatomical differences in sensory regions in ASC (Habata et al., 2021). However, adult (and childhood studies) make it difficult to untangle primary from secondary brain changes associated with ASC. Given that sensory features are among the earliest signals of ASC in infancy, the development of sensory systems in the postnatal period is crucial to understand.

Objectives:

Here, we tested the hypothesis that the volume of key sensory brain regions is altered at birth in neonates with a higher likelihood of atypical neurodevelopment. We compared how sensory regions correlated with each other between groups to understand how these regions are connected and grow together.

Methods:

92 new-born infants underwent T2-weighted sequences on a 3T MRI scanner. 37 infants (23M and 14F) born at an average of 39.02 (SD=1.94) weeks gestational age (GA) and scanned at an average 42.10 (SD=1.81) weeks postmenstrual age (PMA) were classified as higher likelihood (HL) of neurodevelopmental infants if they had a first-degree relative with ASC and/or Attention Deficit Hyperactivity Disorder (ADHD). 55 infants (25M and 30F) born at an average 39.80 (SD=1.32) weeks GA, scanned at 42.31 (SD=1.40) weeks PMA were classified as lower likelihood (LL) with no family history of neurodevelopmental conditions. Neonates with significant physical health conditions and/or clinically relevant incidental MRI brain anomaly were excluded.
Primary sensory grey matter volumes examined included the occipital lobe (OL) (containing the visual cortex), the insula (gustatory cortex) posterior superior temporal gyrus (PSTG) (auditory cortex), and thalamus (relaying sensory information).

The equality of independent inter-correlations (left and right regions) were examined by transforming Pearson’s correlations to Fisher-z scores (Snedecor et al., 1980). Multiple comparisons were controlled using the False Discovery Rate method (BH95) with a at 5%.

Results:

There were no significant between group differences in sex, age at birth and age at scan. General linear models were run on individual regions of interest, with total brain tissue volume, GA at birth, PMA at scan, sex and sex*risk as co-variates. The results revealed no differences between HL and LL sensory volumes.

We found that the correlation between left OL and right PSTG (LL r=0.528, HL r=0.813) (z=2.49, p=0.013) was significantly smaller in the LL group compared to the HL group however this did not survive FDR.

Conclusions:

Our preliminary findings revealed no significant differences when comparing HL and LL sensory region-of-interest volumes. However, inter-regional correlations indicated a larger correlation in HL-group between the left OL and right PSTG (auditory cortex). This suggests that sensory information may be processed and integrated differently in the visual and auditory domain in neurodevelopmental conditions in early development. However, this warrants further investigation on how these regions develop longitudinally.
The current study and imply a potentially more pronounced role for the right hemisphere in language development in autism. Increased lobule IX GMV in right-handed autistic preschoolers (p
< .001, k=1303). Within ASD, voxel-wise regressions with phenotypic measures revealed that increased GMV in right lobule IX (p
< .001, k=261), and left lobule I-V (p
< .001, k=85) were associated with greater social-communicative (SRS-2) impairment. Right lobule IX was also associated with more severe motor (PANESS) (p
< .001, k=403), repetitive/restrictive behavior (RBS-R) (p
< .001, k=168), and overall ASD symptoms (ADOS-2) (p
< .001, k=274). These relationships were driven by ASD boys.

Conclusions:

Complementary approaches investigated autism-associated differences in cerebellar structure, including VBM and an innovative ROI approach. While ROI analyses revealed no effects of diagnosis, voxel-wise methods revealed that ASD girls showed localized clusters of increased lobule IX GMV. VBM further revealed that decreased lobule IX GMV was associated with more severe core autism traits, particularly within ASD boys. Our findings suggest sexually dimorphic patterns of cerebellar structure and associations with symptom severity in ASD children. The predominance of VBM (vs ROI) findings suggests the presence of more localized alterations in cerebellar structure that may be less detectable using ROI-based approaches.

Examine the Role of White Matter Microstructures in Language Development in Autism


Background: Language abilities are highly variable in autistic children and can range from above average abilities to severe language difficulties (e.g., Baird & Norbury 2016). It is unclear what underlies this heterogeneity. Investigating neuro-anatomical microstructures in white matter pathways known to be involved in typical language development can provide us with more information regarding their role in language heterogeneity in autism and can help us disentangle neural and behavioral mechanisms impacting language abilities in autism.

Objectives: To clarify the role that white matter microstructures in known language pathways play in the language development of autistic preschoolers.

Methods: As part of the multisite Preschool Brain Imaging and Behaviour Project (PIP), receptive and expressive language abilities of 59 preschoolers (n autistic = 25, n non-autistic = 34) were examined using the Mullen Scales of Early Learning (MSEL) and a spontaneous language sample (including mean length of utterance). Note that this is only a subset of data from one out of five data acquisition sites and data from other sites will be added. Participants were invited to undergo an MRI scan during their natural sleep, which included diffusion tensor imaging (DTI) to characterize white matter microstructures. Group differences between the autistic and non-autistic group were assessed and partial correlations between language variables and white matter microstructures while controlling for age were investigated. Mixed effects regression will be employed on the larger sample to estimate the relationship between white matter and language abilities.

Results: Non-parametric group differences indicated significantly lower expressive and receptive language scores on all language measures in the autistic group compared to the non-autistic group. No significant group differences were observed for any of the variables characterizing white matter microstructures. Whole sample partial correlation analyses to characterize the continuous sample revealed significant negative associations between expressive language and mean diffusivity in the anterior segment of the right arcuate fasciculus (p = .40, p < .05). When examining the different groups, for the autistic preschoolers only, a significant, positive association was observed between expressive language and fractional anisotropy (p = .84, p < .01) and a negative association between expressive language and radial diffusivity (p = .77, p < .01), both in the long segment of the right arcuate fasciculus.

Conclusions: Results indicate that for our whole sample, higher language abilities were associated with lower mean diffusivity in the arcuate fasciculus, which is in line with previous work indicating language impairment in school-aged autistic children and non-autistic children with language difficulties to be associated with elevated values of mean diffusivity (Nagae et al., 2011; Vydrova et al., 2015). Associations between right arcuate fasciculus microstructures and expressive language in our autistic group are a novel finding of the current study and imply a potentially more pronounced role for the right hemisphere in language development in autism.
Background: Maximum grip strength may be indicative of brain-body communication efficiency (Carson, 2018) and is associated with the prominence of autism-related features (Travers et al., 2015; Kern et al., 2011). During childhood, grip strength is similar in autistic and non-autistic individuals, but in adulthood grip strength and its neural correlates are differ based on diagnosis (Travers 2015; Travers 2017). However, the neural correlates of grip strength in autistic children are unknown, making it unclear if the differing neural mechanisms driving diagnostic differences during adolescence are present from early childhood or arise concurrently with behavioral differences. Additionally, it is unclear how brain-behavior relationships are influenced by co-occurring attention-deficit/hyperactivity disorder (ADHD), which has been shown to be a meaningful source of neural heterogeneity within the autistic population (Yerys et al., 2019). In non-autistic adults, maximal grip strength is associated with microstructural properties of the lateral grasping network (LGN), proprioception input network (PIN), and cerebellar modification network (CMN) (Schulz et al., 2012; Koppelmans et al., 2015). Yet, we do not know if relationships between brain structure and grip strength are similar in non-autistic and autistic children or how co-occurring ADHD features may influence these relationships.

Objectives: 1) Characterize the microstructural neural correlates of grip strength in autistic and non-autistic children. 2) Evaluate to microstructure-grip relationships within autistic children with and without elevated ADHD features.

Methods: Bimanual maximum grip strength and diffusion weighted imaging data were collected from 132 children (62 autistic; 6.02-10.97 years). Vanderbilt NICHDQ scores were used to determine the presence of elevated ADHD features (37 autistic children). Multi-shell DWI were acquired using a 3T GE Scanner and processed with TiDi-Fused imaging (Guerrero-Gonzalez et al., 2022). Bilateral white matter pathways of the LGN, PIN, and CMN, (Figure 1) were delineated using probabilistic tractography. Weighted median free water elimination-corrected fractional anisotropy (FWE-FA) was calculated in each bilateral tract. General linear models predicted tract-specific FWE-FA from grip strength, group (autistic vs non-autistic OR autistic-elevated ADHD vs autistic non-elevated ADHD), and their interaction while accounting for age, sex, and head motion. Results were corrected for multiple comparisons using FDR.

Results: 1) Significant grip strength main effects were found in the LGN and PIN across autistic and non-autistic children. No significant grip strength-by-group interaction effects were found (Figure 1A). 2) Neural correlates of grip strength were distinct in autistic children with and without elevated ADHD features (Figure 1B), as indexed by significant grip-by-group interaction effects in the PIN and CMN (Figure 2).

Conclusions: Results suggest that for maximal grip, autistic and non-autistic children rely similarly on core motor networks (LGN) but differentially on proprioceptive input and cerebellar feedback. Alternative network reliance may depend on the presence of co-occurring ADHD features, indicating that brain-body communication may be distinct in autistic sub-populations. Importantly, these group-specific neural mechanisms contribute to similar grip force, suggesting equal network efficiency. These results have implications for understanding the neurobiological underpinnings of motor differences in autistic children and may impact how we interpret and assess motor behaviors in autistic sub-populations.

Background: The 16p11.2 BP4-BP5 deletion confers high risk for autism spectrum disorder (ASD) and is one of the pathogenic variants most frequently diagnosed in the clinic. Morphometric studies using T1-weighted magnetic resonance imaging (MRI) have revealed large and pervasive volumetric alterations in 16p11.2 CNV carriers. However, the specific neuroanatomical mechanisms underlying such changes, as well as their developmental trajectory, are still unclear.

Objectives:
To characterize brain microstructural connectivity and network organization patterns in young children sharing a deletion of the 16p11.2 locus, the same mechanism and genetic risk factor to develop ASD.

Methods:

We explored differences in structural brain connectivity in a cross-sectional study involving 24 young children carrying a 16p11.2 deletion and 66 typically developing children between 2 and 8 years of age. Diffusion MRI data was collected to compute intra-axonal volume fraction and its developmental modelling. We also computed network node metrics such as node strength, closeness, betweenness, efficiency, clustering and participation coefficient.

Results:

Estimated bundle-specific intra-axonal volume fraction revealed large effect size alterations in microstructural connectivity (0.96 to 1.95 Cohen's d). Weighted graph metrics in 16p11.2 deletion children showed significantly higher global efficiency and betweenness. Areas exhibiting altered connectivity metrics in 16p11.2 deletion children were previously associated to a spectrum of brain functions, including language (superior temporal sulcus, transverse temporal and supramarginal gyri), motor skills (precentral gyrus and inferior parietal lobule), and socio-emotional processing (superior temporal sulcus and rostral anterior cingulate).

Conclusions:

Our results shed light on the neuroanatomical basis of the previously reported increase of white matter volume in volumetric studies. The alterations of structural connectivity present in 16p11.2 deletion children are also in line with evidence of altered number of neurons, axonal diameter and synaptic function in 16p11.2 mice models, deviating the maturation of specific neuronal circuits from typical neurodevelopmental trajectories. Future work is warranted to determine how these alterations contribute to the emergence of symptoms observed in young children diagnosed with autism and other neurodevelopmental disorders.

410.121 (Poster) Sensory Profiles Are Linked to Brain Morphometry in Autism


Background:

Autism is a very diverse and heterogeneous clinical condition. This heterogeneity is particularly apparent in sensory processing where alterations can range from hypo- to hyperreactivity, with effects on all sensory domains.

Objectives:

We assumed that the biological underpinnings of these alterations would manifest themselves already on the structural brain level. Hence, we wanted to unravel if morphological brain patterns are linked to sensory processing profiles in autism. Further, we were interested if sensory processing profiles might be an eligible candidate to stratify the autism spectrum.

Methods:

We used canonical correlation analyses to unravel underlying patterns between sensory processing profiles and vertex-wise estimates of cortical and subcortical volumes of 204 autistic participants ($M_{age} = 16.12, SD = 5.34$, range = 7 – 31 years, 29% female). Sensory processing profiles were assessed using the Short Sensory Profile.

Results:
Our results show that sensory profiles were associated with structural brain features ($RV$-coefficient $= 0.06$, $p = .002$). Comparing participants with low levels of sensory alterations to participants with high levels, our analyses suggest that the underlying brain volume patterns were different between those groups (Tucker’s congruence coefficient $= .72$). Despite those differences on a morphological level, our findings indicate that for the clinical phenotype, i.e., the sensory processing profiles, there is a common, underlying latent factor underlying both groups. Exploratory analyses showed that this latent factor was associated with scales assessing repetitive behavior ($r = .61$) and ADHD symptomatology ($r = .47$) in our sample.

Conclusions:

We conclude that sensory processing is an important aspect to stratify and describe the autism spectrum. As we can show that the differences between sensory processing groups are already manifest on a structural brain level, we argue that alterations in sensory processing are not only due to a different brain functioning but seem to have a biological underpinning in brain morphology. Underlining the associations between sensory processing and clinical symptoms like repetitive behavior and ADHD, our findings are also of practical clinical relevance and might spark future research within this domain.

410.122 (Poster) Neural Correlates of Speech Onset Delay in Autistic Males: A Follow-up, Voxel-Based Morphometry Study

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Background:

Autism spectrum disorder (ASD) is a severely impairing neurodevelopmental disorder but lacks a biomarker for early detection or diagnosis. In addition, heterogeneity within the diagnostic entity hinders searching the brain mechanism of ASD. Speech onset delay, commonly seen in autistic children, predicts long-term outcomes and could serve as a potential phenotype marker of subgrouping ASD. However, the specific neural correlates of speech onset delay in ASD remain unknown; for example, no consistent results from previous structural MRI studies. Despite some evidence showing the importance of the age effect, very few studies focused on the developmental change either based on longitudinal data or considering the age differences in cross-sectional data.

Objectives:

This study investigates the structural neural correlates of speech onset delay by voxel-based morphometry (VBM) analysis and analyzes the possible age differences in cross-sectional and follow-up data.

Methods:

Right-handed, mandarin-speaking males who completed the MRI assessment at baseline and follow-up in a well-characterized cohort were included in this study. Structural MRI data from 33 autistic males with speech onset delay (ASD+SD), 37 autistic males without speech onset delay (ASD-SD), and 46 typically developing comparisons (TDC) were processed using VBM. The clinical diagnosis was further confirmed by Autism Diagnostic Interview-Revised (ADI-R) and Autism Diagnostic Observation Schedule. The speech onset delay was defined if the items in the ADI-R about the age of the first word after 24 months or first phrase after 33 months.

Results:

In the cross-sectional data of the participants’ first MRI study, smaller relative grey matter (GM) volume over the bilateral occipital-parietal lobe was noted when comparing ASD+SD with TDC and total autistic participants with TDC after including age as covariate. On the other hand, larger relative GM volumes over the bilateral inferior frontal cortex were noted when comparing ASD+SD with ASD-SD. We further sub-grouped the participants into children (age $< 13$ years) and adolescents (13 $< age < 18$ years) according to their age at baseline. The difference over the occipital-parietal lobe was noted in childhood, while the difference over the inferior frontal cortex was noted in the adolescent group. The follow-up data analysis from childhood to adolescence/young adulthood supported different developmental changes in the significant group-by-time interaction over the inferior frontal cortex and limbic area. Additionally, two clusters with significant group-by-time interaction were noted over the left cerebellum and the right middle temporal region. The age-adjusted residual GM volume of the inferior frontal cluster was significantly correlated with the verbal IQ within the autistic population but not the performance IQ.

Conclusions:

Our study found the structural neural correlates of speech onset delay within the autistic population. The age difference in cross-sectional structural imaging data was partly supported by the different developing changes in follow-up data. These identified neural correlates could serve as potential subgrouping markers within ASD. The findings also suggested that structural neural correlates, either diagnostic or
subgrouping markers of ASD, might differ by age and depend on developmental stage. Future studies about neural image markers should consider the age effects carefully.

410.123 (Poster) Acquiring MRI Scans in Preschool-Aged Children during Natural Sleep Is Effective across the Entire Autism Spectrum

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Background: Young children have historically been underrepresented in autism neuroimaging research due to challenges in acquiring MRI scans without sedation or anesthesia. Scanning during natural sleep has become an increasingly popular strategy, but it is unclear whether factors such as sleep problems, developmental ability, and intensity of autistic features influence scanning success rates.

Objectives: To evaluate scan-acquisition success rates in a large cohort of autistic and non-autistic children evaluated between 2006-2022 and to identify participant characteristics that may influence scan-acquisition success.

Methods: Preschool-aged children (2-4 years of age) with autism spectrum disorder (ASD) and age-matched non-autistic typically developing (TD) children were enrolled in a longitudinal neuroimaging study. Diagnoses were confirmed upon study entry using the Autism Diagnostic Observation Schedule (ADOS) and Autism Diagnostic Interview-Revised (ADI-R). Children’s developmental abilities were assessed using the Mullen Scales of Early Development (MSEL). Information regarding each child’s behavioral challenges, adaptive functioning skills, sleep problems, and sensory sensitivities was collected through the parent-completed Child Behavior Checklist (CBCL), Vineland Adaptive Behavior Scales, Second Edition (VABS-II), Child Sleep Habits Questionnaire (CSHQ), and Short Sensory Profile (SSP), respectively. Parents also completed a demographic survey. Structural, diffusion-weighted, and resting state functional MRI sequences were acquired using a 3T Siemens scanner (total scan time ~40 min). Scans were conducted around the child’s usual bedtime. If scans were not acquired on the initial scan attempt, families were given the option to return another night to try again. Scanning success was categorized as being full (all sequences acquired), partial (at least one but not all sequences acquired), or unsuccessful (no sequences acquired). One-way ANOVA was used to evaluate whether specific participant characteristics influence scan-acquisition outcomes.

Results: The study sample comprised 511 children: 333 children with ASD (227 males/106 females) and 178 TD children (101 males/77 females). Children were between the ages of 2 and 5 years old at the time of their scan (mean age= 38.2 months). Overall, scans were acquired in 87.87% of children (58.32% completed the full scanning protocol, 29.55% partial) and were unsuccessful for 12.13%. Of families who returned for a second attempt, 72.9% were successful. Of the partial success scans, 21.2% were due to children sleeping on their side, which prevented the acquisition of diffusion-weighted and resting state sequences. When comparing children who successfully completed MRI acquisition (full or partial) to those who were unsuccessful, rates did not differ between ASD and non-ASD groups (p= 0.1297), between sexes (p= 0.2284), or by parental education (p= 0.6304). Within the ASD group, there were no differences between participants who had successful scans versus those with unsuccessful scans on ADOS calibrated severity scores, MSEL DQ scores, and CSHQ total scores (all p’s > .60). In addition, scan-acquisition success did not vary with VABS-II composite scores, SSP total scores, or CBCL internalizing or externalizing T scores (all p’s > .10).

Conclusions: MRI scanning during natural sleep is highly effective in preschool-aged children with diverse developmental abilities and support needs.

410.124 (Poster) Associations between Longitudinal Changes in Cortical Thickness and Restricted/Repetitive Behaviours in Adolescents with Autism Spectrum Disorder.

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Background: The neuroanatomy of autism spectrum disorder (ASD) shows highly heterogenous developmental trajectories across individuals 1,2. Likewise, the behavioural characteristics of ASD are changing across the lifespan 1, with puberty representing a challenging stage of life for individuals with ASD 1. However, there is limited knowledge on longitudinal relationships between brain and behaviour, as well as their genetic underpinnings.

Objectives: The aim of this study was to compare longitudinal trajectories of cortical thickness (CT) in adolescents with ASD to those in typically developing controls (TD), and to examine their association with intra-individual variation in restrictive and repetitive behaviours.
Background:
Autism Spectrum Disorder is a condition characterized by impairments in social communication and interaction (SCI), and restrictive and repetitive behaviors (RRB)\(^1\). Autism has been associated with differences in neuroanatomy, such as cortical thickness (CT) and Surface Area (SA)\(^\text{2,3}\), and differential gene expression\(^4\). However, the categorical conceptualization of autism used in most studies fails to represent its high clinical heterogeneity as well as autism symptoms in subclinical and neurotypical populations. Additionally, the SCI and RRB symptom domains are likely to be associated with alterations in different brain regions\(^5\), and potentially linked to distinct putative underlying mechanisms\(^6\).

Objectives:
This study’s aim was therefore to 1) investigate the differential associations of dimensional symptom severity in SCI and RRB with alterations in CT and SA, and to 2) establish their putative genomic underpinnings 3) across a combined autism and neurotypical sample.

Methods:
572 participants, aged 6-30 (332 with autism, 27.71% female; 240 typically developing (TD), 39.17% female) underwent structural MRI-scanning at 7 different sites\(^7\) using 3T head-scanners. CT and SA were extracted from T1-weighted volumetric images using FreeSurfer.
SCI and RRB were operationalized using a short-form of the Social Responsiveness Scale (SRS-16), and the Restricted and Repetitive Behaviour Scale (RBS-R). The association between symptom severity and neuroanatomy was investigated by regression of a general linear model with SRS-16 or RBS-R, sex, age, IQ, Site and Mean_CT or Total_SA as model terms. A gene expression decoding analysis was performed within Neurosynth and Neurovault, utilizing gene expression data from the Allen Human Brain Atlas to assess the spatial correlation between our neuroimaging t-map and the patterns of expression for each of 20,787 protein coding genes. The resulting gene list was tested for enrichment of genes known to be associated with autism on the genetic and transcriptomic level.

Results:

Following random-field-theory-based cluster-correction (p<.05, two-tailed), increased symptom severity in SCI was associated with decreased occipital CT, decreased frontal SA and increased SA in central and fusiform gyri. Increased RRB symptom severity was associated with decreased CT in paracentral and posterior cingulate, decreased frontal SA and increased SA in posterior cingulate and fusiform gyrus (see Fig.1). For the t-map of neuroanatomical associations with RRB, we observed a significant enrichment of CTX.M16.down that is downregulated in autism, a gene set previously related to neuronal firing rates. The SCI t-map showed high expression of CTX.M19.up that is upregulated in autism and previously identified to have an altered developmental trajectory in autism.

Conclusions:

The associated neuroanatomy, as well as their genomic underpinnings, seem to be different for SCI and RRB domain, suggesting distinct neuroanatomical and genomic markers for the two core autism symptom domains. Our findings might thus contribute to establishing neuroanatomical and genomic biomarkers for distinct autism symptom domains. Differentially considering dimensional measures of autism core symptoms therefore constitutes another step towards precision medicine in autism.

Cognition: Attention, Learning, Memory

Panel Discussion — COGNITION: ATTENTION, LEARNING, MEMORY

208 - The Behavioral and Neurobiological Basis of Impaired Memory in ASD: The Heterogeneous Patterns and Interventions

Panel Chair: Lang Chen, 500 El Camino Real, Santa Clara University, Santa Clara, CA

Discussant: Vinod Menon, Stanford University, Stanford, CA

Recent studies revealed profound memory dysfunctions in individuals with ASD across social and non-social domains beyond their characteristic socio-communicative dysfunctions. Given the critical role of memory in developing cognitive and social skills, we need to understand the behavioral and neurobiological basis of memory dysfunctions in ASD and the effectiveness of relevant interventions. In this panel, we will present novel research findings on (i) heterogenous pattern separation memory and aberrant hippocampal circuits in children with ASD (from Dr. Chen at Santa Clara University with with Dr. Menon at Stanford University), (ii) animal models of the hippocampus and its relation to social memory (from Dr. Gould at Princeton University), and (iii) two intervention studies to remediate memory dysfunctions in ASD (from Dr. Wantzen at Université Bourgogne Franche-Comté and Dr. Delage at Université de Genève). These studies pointed to the hippocampus as a critical neurobiological basis for the memory dysfunction for both social and non-social stimuli in ASD, and cognitive interventions could potentially improve their memory, social and language skills. This panel provides findings from diverse approaches (behavioral, cognitive, neuroimaging, and animal research) and links the neuroscientific findings to interventions for ASD, which will clearly be of broad interest to the INSAR attendants.

208.001 (Panel Discussion) The Role of the CA2 Region in Social Memory in Developing Shank3B Knockout Mice: Potential Relevance to Autism Spectrum Disorder

E. Gould and E. J. Diethorn, Princeton Neuroscience Institute, Princeton, NJ

Background: Numerous studies have found that the CA2 region has unique molecular characteristics, including high expression of perineuronal nets (PNNs), specialized extracellular matrix structures known to regulate plasticity. The CA2 has also been shown to play an important role in social recognition memory, an important ability across mammalian species. Studies suggest that some people with Autism Spectrum Disorder (ASD) have difficulty recognizing familiar faces and voices. The etiology of ASD appears to be multifactorial, with the disorder arising through a complex interaction between genes and the environment. Genome wide association studies have identified...
multiple genes linked to ASD, including SHANK3, whose mutation can cause Phelan-McDermid syndrome (PDS) and FMR1, whose mutation can cause Fragile X syndrome (FXS). Both PDS and FXS can present with symptoms of ASD. Mouse models have been generated by transgenic ‘knock out’ of these genes, and both Shank3B and Fmr1 KO mice exhibit behavioral phenotypes that are relevant to ASD, such as excessive repetitive behavior and deficits in social interactions.

**Objectives:** Since ASD is a neurodevelopmental disorder, we sought to determine whether developmental trajectories of CA2-dependent social discrimination abilities are affected in Shank3B and Fmr1 KO mice and, if so, to probe the neural underpinnings of this dysfunction. We also sought to determine whether interventions in developing Shank3B KO mice are capable of restoring this function.

**Methods:** Wildtype (WT), Shank3B KO and Fmr1 KO mice of both sexes were used for these studies. Mice were tested on social discrimination tests during development and in adulthood. Brains were examined for potential differences in PNNs using labeling with the plant lectin Wisteria Floribunda Agglutinin and Aggrecan, and for potential differences in CA2 excitatory innervation using labeling for vesicular glutamate transporter vGLUT2. Manipulations of PNNs in the CA2 were conducted with the degradative enzyme chondroitinase ABC (chABC) in developing Shank3B KO mice to determine whether atypical PNNs contribute to social memory impairment.

**Results:** We found that WT mice can discriminate between novel and familiar mice around postnatal day 14 (P14), demonstrating a preference for novel peers, while both Shank3B and Fmr1 KO mice lack the ability to socially discriminate at this time, although Fmr1 KO mice eventually attain this function in adulthood. At P14, Shank3B KO mice have elevated CA2 PNNs relative to WTs, while Fmr1 KO mice have diminished CA2 PNNs. Atypical PNNs may alter CA2 afferents, with vGLUT2 intensity elevated in both models compared to WTs. In Shank3B KO mice, reducing CA2 PNNs restored social discrimination function and emerging novelty preference during development (Figure 1).

**Conclusions:** Our findings suggest that social discrimination abilities arise early in WT mice, but not in Shank3B KO and Fmr1 KO mice. Diminishing CA2 PNNs down to healthy levels in developing Shank3B KO mice improves social discrimination and allows for emerging social novelty preference, indicating points of intervention for enhancing social memory in this mouse model. The extent to which these findings pertain to humans with ASD remains unknown.

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**208.002 (Panel Discussion) Atypical and Heterogeneous Pattern Separation Memory Abilities and Aberrant Hippocampal Circuits in Children with ASD**

*L. Chen*, J. Liu and V. Menon*, (1)500 El Camino Real, Santa Clara University, Santa Clara, CA, (2)Neuroscience Program, Santa Clara University, Santa Clara, CA, (3)Stanford University, Stanford, CA

**Background:** Pattern separation memory, a critical ability to form distinct memories from similar occurrences, is strongly associated with the function of hippocampus. Researchers have suggested that atypical pattern separation memory was associated with various clinical disorders including Autism spectrum disorders (ASD). Although recent studies have revealed a broad episodic memory impairment in individuals with ASD compared to their typically-developing (TD) peers, little is known about their pattern separation memory and the potential abnormality in hippocampal circuits in affected individuals, especially in children with ASD.

**Objectives:** Using a well-established behavioral paradigm for studying pattern separation memory, we aimed to show that children with ASD had atypical and heterogeneous pattern separation memory abilities compared to their TD peers. In addition, we aimed to reveal the dysfunctions in hippocampal circuits that were associated with their memory deficits in ASD.

**Methods:** Sixty-nine children with ASD (10F; M\text{age}=10.08, SD\text{age}=1.25) and 57 well-matched TDs (9F; M\text{age}=10.04, SD\text{age}=1.21) were tested on a pattern separation task (BPS-O), in which children were first shown images of everyday objects, and then performed a surprise memory test to identify “Old”, “Similar”, or “New” items from a new series of images (1/3 being repeated Target items, 1/3 being perceptually similar but not identical Lure items, and 1/3 being complete new Foil items). We first compared the accuracy between ASD and TD in the BPS-O task, and then derived a metric, i.e., $1-p$\text{(Old) for Target, Lure of varying similarity, and Foil items, to characterize subgroups of distinct profiles of pattern separation memory in ASD with a data-driven clustering approach. A subset of these children (25 in ASD and 29 in TD; well-matched on gender, age and IQ) also completed a resting-state fMRI scan, and we examined the functional connectivity of bilateral hippocampus seeds (+/-24, -14, -20) as well as its relationship to memory deficits across individual with ASD.

**Results:** We showed an overall impairment in pattern separation memory for nonsocial contents in children with ASD compared to their TD peers (Figure 1A). More interestingly, with a data-driven clustering analysis, we revealed three distinct profiles of atypical pattern separation memory performance in ASD (Figure 1B). Moreover, we observed hyper-connectivity of bilateral hippocampus with fusiform gyrus, thalamus, cerebellum, medial prefrontal cortex, and anterior cingulate cortex in ASD compared to TD, and the aberrant hippocampal connectivity was predictive to the memory abilities across individuals with ASD (Figure 2).

**Conclusions:** Our study demonstrated novel evidence on impaired pattern separation memory in children with ASD in the nonsocial knowledge domain, and there existed distinct subgroups with different profiles of atypical pattern separation memory. Findings from the resting-state functional connectivity also suggested that children with ASD had excessive brain connectivity of bilateral hippocampus,
converging on an observation that dysfunctions in hippocampus may underlie the memory impairment in children with ASD. This work highlighted the importance of focusing on the memory functions in ASD for future interventions, particularly aiming to remediate the atypical hippocampal circuits.

**208.003 (Panel Discussion) A Pilot Cognitive Intervention Program in ASD: Autobiographical Memory As a Tool for Improving Social Interaction**

**P. Wantzen** and B. Guillery-Girard, (1)LEAD-Université Bourgogne, Caen, France, (2)LEAD, CNRS UMR 5022, Université Bourgogne Franche-Comté, Dijon, France, (3)Normandie Univ, UNICAEN, PSL Research University, EPHE, INSERM, U1077, CHU de Caen, Neuropsychologie et Imagerie de la Mémoire Humaine, 14000 Caen, France, Caen, France

**Background:** Autobiographical memory (AM) is closely linked to self-identity and as a fundamental tool in social functioning. The AM is impaired in Autism spectrum Disorders (ASD), with reduced retrieval, specificity, and elaboration. Atypical AM makes it harder for individuals to initiate, develop, and maintain social interactions. Reduced social relations do not allow the acquisition of sufficient knowledge about oneself and disrupt the self-related information consolidation in memory. This fragmented consolidation will, in turn, impact the adaptation to new situations. For these reasons, AM may be a relevant tool for rehabilitation programs in ASD.

**Objectives:** We developed a cognitive intervention focusing on social interactions through AM. This program aimed to improve conversational skills and social interactions in adolescents with ASD. The originality of the present study lies in using the strengthening of AM as an adapted ecological communication tool to improve social inclusion and social identity.

**Methods:** We designed a cognitive intervention program consisting of individual and group sessions aimed to improve AM. The experimental intervention consisted of 8 weekly 90-min sessions. ASD participants underwent pre- (T1) and post-assessments (T2) of AM, and a general cognitive evaluation. The 30-min individual sessions were conducted with a therapeutic education approach and included personalized follow-up. During the sessions, participants focused on their specific difficulties. Group sessions were designed to improve participants' narrative and conversational skills, by encouraging them to share personal memories and knowledge, thus creating common social interaction bonds. We conducted a pilot study among three adolescents with high-functioning ASD, aged 12, 16, and 17 years (two males). Three other participants with ASD, not included in the rehabilitation program, were randomly selected for a comparison follow-up at T1 and T2. We compared each ASD participant's scores with scores of 13 age- and intelligence-matched controls and calculated z-scores.

**Results:** The first results seem to point to a beneficial effect of the workshops on the social relationships of adolescents with ASD. We showed at T2 increased extra-family narrative references and more markers of social integration. This result may reflect a social openness, beyond the family framework, with memory retrieval including more people. Qualitative observations showed that social interactions were facilitated during the intervention: adolescents spontaneously asked each other and increasingly took the initiative in interactions. For the three ASD participants who did not follow our intervention, we showed limited changes after one year concerning the narratives on the social spheres.

**Conclusions:** Although these results are preliminary, they are also encouraging. Our study of autobiographical narratives yielded interesting findings about how AM can be targeted in rehabilitation programs as a vector of social interaction. This approach allowed participants to gain a better understanding of their personal identity and relations with others through the sharing of memories. Consequently, the interventions helped them develop and reinforce their social identity and integration.

**208.004 (Panel Discussion) Impact of Working Memory Training on Syntax and Processing Speed in Children with ASD**

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**Background:** In addition to persistent deficits in communication and social interaction, children with Autism Spectrum Disorders (ASD) have been reported to present weaknesses in complex syntax (e.g., Tuller et al., 2017) and working memory (WM) (e.g., Habib et al., 2019). Some empirical evidence suggests that these two deficits are closely related (Schuh & Eigsti, 2012; Durrleman & Delage, 2016). In previous work, we have studied the effects of WM training on the syntactic abilities of 32 children aged 6-12 with another condition affecting both of these domains: Developmental Language Disorder (DLD). We administered training via a novel iPad program, Magic Memory, which targets simple and complex spans. Participants benefited from this training to significantly improve on both WM and expressive syntax, which was not the case of age-matched children with DLD who received an alternative, global scholastic training (Author et al., 2019, 2021).

**Objectives:** Pursuing our investigation of the effects of WM training on syntax, this work extended the methods of the DLD WM training study to a population of children with ASD, using our Magic Memory training program. We predicted a significant increase in working memory scores following training as well as a significant improvement in complex syntax. This study also included attentional measures, in light of the observation that WM is closely linked to the attentional system (e.g., Veer et al., 2017).
and children with ASD are known to experience difficulties in executive functions. Given that intensive training might have a specific impact on attention, we also predicted an improved performance in attentional measures after training. Finally, participants completed a long-term follow-up three months after training. We predicted that potential effects on WM, syntax and attention would be maintained after such a delay.

Methods: Thirty French-speaking children with ASD aged 5 to 11 were trained on WM via Magic Memory. Baseline (T1) abilities were established via pre-tests one week prior to the first training session, comprising two 45-minute sessions to assess memory, attentional skills and syntactic abilities (using elicited production, repetition and comprehension of complex sentences). Participants then completed the 8-week intensive training regimen of three 30-minute sessions per week for a total of 12 hours. Tests were completed again one week after training (T2) with exactly the same structures but different items, matched in frequency, length and complexity, to avoid practice effects. Post-tests (T3) were administered three months after T2, to assess the long-term stability of effects.

Results: Results showed a direct effect of the training with significant improvement on untrained WM tasks, as well as transfer effects with better abilities in processing speed and expressive/receptive syntax. Moreover, long-term transfer effects were similarly positive, with improvements maintained on all measures showing T1 to T2 gains, whether in the areas of syntax or attentional skills.

Conclusions: These exciting findings provide impetus for further studies of working memory interventions. Thereafter, the training materials should be made available to children with WM or syntactic impairments, regardless of the proximal source of those impairments (e.g., DLD or ASD).

ORAL SESSION — COGNITION: ATTENTION, LEARNING, MEMORY

319 - Perception of Social & Non-Social Information

Moderator: Sebastian Gaigg, City, University of London, London, UNITED KINGDOM

319.001 (Oral) Autistic Group Differences in Social Attention AreMagnified By Real-World Perceptual Load and Linguistic Features

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Background: Autistic adults report experiencing difficulty with both social interaction and sensory processing in everyday life, but little is known about the causal relationship between these disparate functional domains. In the present study, we sought to understand how a core characteristic of the autistic phenotype—reduced social attention—is impacted by the complex multisensory signals and linguistic cues present in real-world environments.

Objectives:

1. Test the hypothesis that reductions in social attention associated with autism would be magnified by increasing real-world perceptual load (e.g., motion, multisensory cues).
2. Characterize the relationship between social attentional dynamics and autistic traits within individual participants.
3. Examine the temporal relationship between social attention and semantic meaning imparted by evolving linguistic cues from agents in the environment.

Methods: Adult participants (N = 40; 19 autistic) viewed a diverse set of 360° real-world scenes via a head-mounted virtual reality display in three experimental conditions. Across these conditions (static, dynamic, multisensory), we systematically varied perceptual load while holding constant the social and semantic information present in each scene. On each trial, participants’ gaze was measured via in-headset eyetracking. To quantify participants’ attention, we generated a continuous model of social information for each scene by combining rich, contextually informed judgments from a set of online human raters with a novel computational language modeling approach.

Results: First, we demonstrate that reduced social attention is not a static signature of the autistic phenotype. Though all participants increasingly allocated their attention toward social information with increasing perceptual load, we observed a significant interaction between group and condition (F(2,1680) = 3.82, p = 0.022), such that each increase across conditions was smaller for group of autistic, relative to non-autistic, participants. Crucially, this pattern was specific to the social domain: we did not observe differential impacts of perceptual load on attention directed toward nonsocial semantic (i.e., object, place) information or low-level fixation behavior (i.e., overall fixation frequency or duration). Second, we found that within participants, the susceptibility of social attention to perceptual load (i.e., the difference in attention between high- and low-load conditions) was significantly correlated with self-reported autistic traits, as measured by the Autism Spectrum Quotient (r = −0.53, p < 0.001). Finally, in a follow-up exploratory analysis, we explored how visual attention evolves over time in coordination with the semantic meaning imparted by real-world linguistic cues. We find a reduction in social attention for autistic relative to non-autistic participants that specifically precedes words of high social relevance (p = 0.006).
Conclusions: Here we provide a direct link between social and sensory processing in autism. Our results suggest that autistic group differences in social attention are not a static phenotypic signature, but instead are modulated by increasing perceptual load of real-world environments. Moreover, we provide evidence that group differences in social attention are temporally linked to semantic meaning embedded within an evolving stream of linguistic cues from social agents in the environment. All in all, our results provide a nuanced characterization of attentional divergence in autism as a cumulative, multimodal, and integrative process.

319.002 (Oral) Multimodal Parent Behaviors during Joint Attention Result in Less Attentional Boost in ASD
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Background: Joint attention (JA), broadly defined as two individuals looking to the same object at the same time, is characterized by a higher frequency of multimodal behaviors in typically developing (TD) children during toy play, particularly more touch of the object (Yu & Smith, 2016). TD children extend the duration of their attention to toys when they are in JA with a parent (Yu & Smith, 2016), especially when the parent is talking about or holding the toy (Yurkovic-Harding et al., 2022). Our recent work has shown that children with autism spectrum disorder (ASD) are able to achieve JA at similar rates and through similar pathways as TD children during toy play (Yurkovic-Harding et al., 2022), but it remains unknown how multimodal parent and child behaviors may modulate JA during naturalistic toy play in ASD.

Objectives: We first sought to use a data-driven approach to identify and characterize distinct subtypes of multimodal behaviors during JA looks. We then aimed to understand if children with ASD and TD children differed in their ability to use these behaviors to engage in JA and to extend their own attention.

Methods: Parents and their 24-48mo children (ASD=17; TD=15) played with toys while wearing head-mounted eye-trackers (Figure 1a). We identified child looks with 0.5s of JA or more and calculated each look’s overlap with child touch and parent look, look to child face, touch, and naming (Figure 1b). An unsupervised clustering approach was used to identify distinct subtypes of multimodality during child JA looks. Data were analyzed using generalized linear mixed effects models.

Results: Looks were classified into one of three clusters (Figure 2a): “Sparse” looks (few behaviors), “Parent” looks (more parent look, touch, talk), and “Child” looks (more child touch). There was a significant interaction of group and cluster on looks per minute (Figure 2b) – children with ASD used the “Parent” cluster less than TD children (F(1,30)=5.27, p=0.03). There was also a significant interaction of group and cluster on duration (F(2,761)=2396.51, p<0.01; Figure 2c). – TD children had a significant boost in look duration from the “Sparse” to the “Parent” cluster (t(214)=2.03, p=0.04), while children with ASD did not (t(147)=0.48, p=0.63). Additionally, “Parent” looks from children with ASD were shorter than those from TD children (F(1,243)=5.15, p=0.02). For both groups, looks in the “Child” cluster were the longest (all p<0.01). Of note, looks with JA were significantly longer than looks without JA for both groups (F(1,2155)=278.34, p<0.01).

Conclusions: Children with ASD were sensitivity to JA, as evidenced by longer look durations overall. However, children with ASD engaged less frequently and for shorter durations when the parent was “directing” the action (i.e., looking to, touching, and talking about a toy). The similar durations of “Parent” and “Sparse” looks suggests that children with ASD are less able to use parent behaviors to extend their own attention (i.e., attentional boost). Instead, children with ASD more frequently followed their own self-generated cues (i.e., hand-eye coordination) and were able to extend their attention through this multimodal behavioral pattern.

319.003 (Oral) Change Blindness and Autistic Traits - a Twin Study.
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Background: Atypical sensory perception is common in individuals with autism spectrum condition (ASC). In particular, autistic traits have been associated with a stronger prevalence to process local over global sensory information, which can be advantageous for perceptual processing tasks that require high attention to detail (e.g., Mottron et al., 2013). Thus, in this study we analyzed how autistic traits influence performance in two different versions of the Change Blindness task where participants are asked to find small alterations in pairs of otherwise identical visual scenes. We modeled these associations in twins, both across the entire cohort and within twin pairs where they are implicitly controlled for familial factors.

Objectives: To further our understanding on perceptual characteristics linked to autistic traits.
Methods: Thirty-six twin pairs (N=72) participated in the experiment so far (mean age ± std =24.4±4.3) from which 9 pairs were discordant or concordant for ASC diagnosis (one or both twins fulfilling diagnostic criteria). In the Change Blindness task, visual scenes where one object was removed from one image were presented (Figure 2). In the original version of the task ("flicker"), the two images were presented one after the other (240ms) in cycles with a blank image in between (80ms). In the "side-by-side" version, both images were presented side by side. Participants had a maximum of 30 s to identify the missing/present item. Participants were eye-tracked while completing the task. Autistic traits were quantified by means of the Autism-Spectrum Quotient (AQ). Data was analyzed with linear-mixed models and a conditional regression to compare twins within pairs.

Results: Across the entire sample, autistic traits were associated with faster response times in the side-by-side condition ($\chi^2=5.53, df=1, p=.019$) where, on average, response times decreased by 47ms for every point increase in AQ (95%CI [−93; −6]) (Figure 1). At the same time, there were no differences in accuracy (i.e., proportion of correct trials) ($\chi^2=.09, df=1, p=.761$) and, therefore, faster responses could not be attributed to a speed-accuracy trade-off. In contrast, there was no significant relationship between autistic traits and performance in the flicker condition (all $p$s >.35). Conditional linear regression revealed that the twins with higher autistic traits showed a trend towards faster responses compared to their twins ($b=-.042, df=30, z=-1.93, p=.053$) with no drop in accuracy ($b=-.003, df=30, z=1.38, p=.017$). In contrast, autistic traits were associated with slower responses in the flicker task within-twin pairs ($b=.059, df=30, z=2.653, p=.008$) but no drop in accuracy ($b=-.002, df=30, z=-1.508, p=.132$).

Conclusions: Higher autistic traits were associated with better (faster) performance in the side-by-side condition – where individuals could inspect the images freely – suggesting a potentially more efficient search strategy in those with elevated autistic traits. Within twin pairs, where a large number of factors is implicitly controlled (family background, age, etc), we found worse/slower performance in association with autistic traits in the flicker condition. Hence, autistic traits can predict better or worse visual search performance depending on the characteristics of the task at hand and the level of control over familial factors.

319.004 (Oral) A Bayesian Modeling Investigation of Perceptual and Meta-Cognitive Decision Making in Autism

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Background:

Recently there has been a growing interest in sensory processing in Autism Spectrum Disorder (ASD) as a core phenotype. Sensory symptoms serve as an independent diagnostic criterion, show a persistent relationship to clinical measurement of higher-level social behavior, and are evident early in development. Perceptual decision-making is a key process at the interface of perception and cognition. Thus, investigation of perceptual decision-making may shed light on the core mechanisms of ASD and their role in altering both simple and complex behaviors. However, little is known about perceptual decision-making in ASD.

Objectives:

Here, using a Bayesian inference framework, we systematically investigated the factors affecting perceptual and metacognitive decisions in ASD. Specifically, we tested the effects of expectation (prior), sensory evidence (likelihood), and reward (cost-function) information on decision criteria in orientation categorization task (perception) and decision confidence judgment (i.e., meta-cognition).

Methods:

The experiments include participants diagnosed with ASD (n = 59) and typically developed (NT) participants (n = 83). Observers simultaneously reported the orientation category of Gabor stimulus and their decision confidence using the keyboard (Fig 1). In the two studies manipulating the prior and the reward, the stimulus orientation was drawn from two Gaussian distributions with means $\mu_A = -4^\circ$ and $\mu_B = 4^\circ$, and standard deviations $\sigma_A = \sigma_B = 5^\circ$, which induced an overlap between the two distributions. To manipulate prior, we varied the base-rate probability of each category. To manipulate the cost function, we varied the reward between categories. To manipulate the likelihood, we varied the stimulus contrast in every experiment. Finally, in a third study, we used an embedded paradigm to examine the criteria shift based on likelihood. We drew the two Gaussian distributions with the same mean $\mu_A = 0^\circ$ and two standard deviations $\sigma_A = 3^\circ$ and $\sigma_B = 12^\circ$. This design requires distinguishing a more specific from a more general perceptual category, which typically leads to criteria shift as contrasts increases.

Results:

Both groups shifted decision criteria to favor the category with a higher base rate or reward, particularly when contrast (sensory evidence) was low (Fig 2A). An optimal observer analysis revealed that both ASD and NT were suboptimal to the same extent (Fig 2B). Finally, the ASD group showed typical abilities in metacognitively assessing their performances. The recruitment of participants for the likelihood
manipulation study is ongoing. Preliminary results show that ASD participants have similar abilities to integrate the likelihood information to adapt their decision criteria.

Conclusions:

Contrary to recent views, individuals with ASD integrate prior expectation with sensory evidence similarly to NT individuals. Moreover, both groups integrate prior and reward information with stimulus likelihood in a suboptimal manner, which is inconsistent with the Bayesian theory. In the context of a visual task, the metacognitive abilities also appear to be preserved. Our study suggests that reduced prior integration or decision suboptimality cannot explain atypical perception in ASD.

411 - Cognition: Attention, Learning, Memory I

411.127 (Poster) A Scoping Review on Immersive VR Research in Neurodevelopmental Disorders
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Background: Use of immersive virtual reality (IVR) in the assessment and intervention of neurodevelopmental disorders (NDDs) is growing fast. We will offer here a general view on the results of this research. According to ICD-11, NDDs are behavioral and cognitive disorders that arise during the developmental period (WHO, 2018). They may involve atypical development of intellectual, social, and linguistic skills (ICD-11), and lead to diagnoses such as disorders of intellectual development, developmental speech and language disorders, autism spectrum disorder (ASD), developmental learning disorder, and attention deficit hyperactivity disorder (ADHD). IVR allows the recreation of controlled real-life situations with high fidelity, sense of presence in 3D virtual environment, and measurement in real time. IVR is most commonly achieved with head mounted displays (HMDs) and cave automatic virtual environments, CAVEs.

Objectives: The aim was to analyze research on IVR assessment and intervention in NDDs to examine what interventions affect functioning in everyday life, and whether human guidance, besides IVR, is essential in the generalization process. Furthermore, we assessed the quality of the research.

Methods: The methods were reported according to PRISMA scoping review guidelines. The data search was performed in June 2021 in Scopus, Ovid PsycINFO and Web of Science. The search terms of NDDs were based on ICD-11. We included studies with children and adolescents; NDDs and IVR intervention or assessment; subjects, methods, and results reported and full text available, in English, from 2010 to June 2021. In March 2022 we used also Iris.ai (AI-powered search tool) and Google Scholar to search for relevant articles published after 2020.

Results: Database search resulted in 1102 papers of which we included 34 articles. IVR was mostly used in connection with ASD for assessment of and intervention in social skills (Figure 1.), and in ADHD for assessment of executive performance. Diagnostic measures varied or were not available, and the level of evidence was generally observational/descriptive (Joanna Briggs Institute Levels of Evidence, Figure 2.). Furthermore, few studies reported on feasibility and user experience and even fewer on human guidance and the generalization of intervention to everyday life. Our results suggest that human guidance during and after immersive VR may be crucial for generalization of skills. More research on IVR in other NDDs is needed, e.g., there were no search results on IVR and developmental language disorder (DLD).

Conclusions: IVR intervention can capture behavioral change, acting as an objective measurement tool, and should be broadened to target more NDDs. IVR makes it possible to practice complex social skills in a controlled situation close to daily life. Generalization of the IVR interventions was analyzed only in a few studies, with small groups of participants and variable designs, which limits the conclusions. Active human trainers and ecologically valid tasks in IVR involve the child in interaction and may help to customize the intervention for the individual. Participatory guidance may in fact, act as a bridge from IVR to real life, supporting the gaining and generalization of new skills for social communication. In future studies, this should be examined in more detail.

411.128 (Poster) A Transdiagnostic Profile of Executive Function in Children with Neurodevelopmental Conditions: A Systematic Review and Multilevel Analysis.
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Background:

Executive function (EF) impairments have been found in many child neurodevelopmental conditions (NDCs). There is limited research examining the potential of EF as a transdiagnostic feature of NDCs and whether EF domains can differentiate NDCs.

Objectives:

The primary objectives of this meta-analysis were to examine EF outcomes across NDCs, to examine moderators of this effect, and to test differentiating EF impairments between NDCs.

Methods:

A systematic review and meta-analysis of EF across paediatric neurodevelopmental conditions was conducted. In line with PRISMA guidelines, a systematic literature review was carried out in MEDLINE, EMBASE and PsychInfo using a selection of relevant terms and covered the period of January 1980 to April 2022. The review was registered with PROSPERO (CRD42020210785). Of 175 identified studies, 96 met selection criteria. Two independent reviewers conducted study screening and assessed against the inclusion criteria. This included all studies that measured EF using established tests in participants under 18 years of age and describing populations comparing two or more NDCs. Methodology followed the PRISMA guidelines. Data extraction and risk of bias assessment was conducted by two independent reviewers. Data was pooled using a random-effects model. Outcomes across seven EF domains included attention, fluency, set shifting, set switching, response inhibition, planning and working memory. Main outcomes included scores on performance and informant-based EF measures. Analyses was conducted using the metafor package in R.

Results: A moderate effect size of EF impairment across all NDCs was found (g=0.70), in comparison to control. Younger children showed larger effect sizes of impairment, as did informant measures of EF. Children with ADHD showed greater problems with attention and response inhibition, children with autism showed larger impairments in set-shifting, while children with LD showed evidence of greater impairments in set-switching.

Conclusions:

EF impairment is a transdiagnostic feature of NDCs that is likely underpinned by accompanying divergence in brain development. Findings support the prioritisation of transdiagnostic approaches to EF delay in NDCs using longitudinal and intervention studies to improve life outcomes for these children.

411.129 (Poster) Altered Perception of Faces in ASD: Perceptual Biases Reveal Weaker Internal Representation of the “Typical” Average Face

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Background:

Atypical perception has been widely reported in Autistic Spectrum Disorders (ASD), and deficits in face recognition skills, in particular, are argued to be associated with social impairments experienced by these individuals. We have recently shown that these face processing deficits arise from perceptual alterations rather than being solely memory based. Moreover, face representations in ASD show reduced inversion and other-race effects suggesting that their facial processing is less refined by long-term statistics. However, the role of experience-based effects in these deficits is still unknown.

Objectives:

Here, we systematically investigated the effect of different timescales of stimulus history on face discrimination in ASD: the effect of (a) accumulated stimulus history given throughout the experiment, and (b) short-term history of stimuli presented on recent trials. These exposure-based effects were compared between own- and other-race faces to examine possible interactions between the statistics given in the experiment and life-long exposure to faces.

Methods:

We used a regression to the mean (RTM) paradigm to quantitatively measure the integration of stimulus statistics within face processing. Typically developed (TD) and ASD individuals performed a two-interval forced choice discrimination task between two faces presented in
succession (Fig 1a). Faces were sampled from a normal distribution around the mean of a sample of 100 morph levels created from two faces (Fig 1b). One half the trials contained the same face, and half were different faces that varied in morph range (Fig 1d). To examine the acquisition of the stimulus history, we tested the contraction of perceptual judgments towards the mean of the distribution (Fig 1c). Different distributions were created for own- and other-race faces.

Results:

TD individuals displayed greater regression effects, such that representations of current faces were biased by prior ones, significantly more for other-race faces than for own-race faces. The dynamics of the perceptual bias investigated by trial-by-trial performance further indicated greater bias by long-term stimulus statistics for own-race faces than for other-race faces. Individuals with ASD displayed overall weaker face discrimination abilities; yet, of most interest, face representations were refined by stimulus statistics, and were equally biased for own- and other race faces. Biases by recent trials equally contributed to performance as long-term statistics, indicating weaker internal model of a “typical” averaged face, even for the more frequently encountered faces (own race). See Fig 2.

Conclusions:

Our findings suggest modulations in the mechanism by which stimulus history affects perceptual representations of faces in autism. The weaker face representations displayed by individuals with ASD were considerably refined by the accumulated stimulus history provided during the experiment. Moreover, contrary to TD, recent trials equally contributed to performance as long-term statistics, indicating weaker internal model of the averaged face, even for own-race faces. The findings provide evidence of reduced specialization of the autistic perceptual system to the more frequently encountered stimulation. This has implications for day-to-day interactions within ASD and encourages therapeutic consideration of how this face processing deficit can and should be treated.

411.130 (Poster) Atypical Processing of Periodicity and Formant Structure of Vowels in the Auditory Cortex of Children with ASD. K. A. Fadeeva, A. O. Prokofyev, D. E. Goiaeva, T. S. Obukhova, T. Ovsyannikova, T. A. Stroganova and E. V. Orekhova. (1) MEG-Center, Moscow University of Psychology and Education (MSUPE), Moscow, Russian Federation, (2) MEG-Center, University of Gothenburg, Moscow, RUSSIA

Background: Speech delay and/or atypical speech are common in children with autism spectrum disorders (ASD) and may, at least partly, stem from abnormal processing of the basic features of speech sounds. Vowels are the most important category of voiced sounds, as they play a crucial role in speech recognition. The identity of a vowel is determined by its formant structure (‘vowelness’), while periodicity (pitch) characterizes a speaker’s identity and helps to track conversation in a noisy environment. These basic characteristics of vowels are detected by the auditory cortex automatically at the early stages of the sound processing stream. It is unknown whether such automatic processing of vowel features is altered in ASD.

Objectives: Here we used magnetoencephalography (MEG) to investigate whether the processing of vowel formant structure and periodicity pitch is atypical in the auditory cortex of children with ASD.

Methods: We independently manipulated the periodicity and formant structure of vowels while measuring auditory cortex responses using MEG in 26 boys with ASD and 20 typically developing (TD) control boys. Groups were matched by age (7-12 years), but not by IQ (KABC-II MPI IQ in TD: 117±15; ASD: 83±17). Subjects watched a silent movie and listened passively to synthetic vowels (‘periodic vowels’) interspersed with spectrally complex sounds matched by loudness and temporal characteristics and characterized either by 83 Hz periodicity (‘periodic non-vowels’), or formant structure (‘non-periodic vowels’), or neither of these qualities (control sound). The duration of all sounds was 800 ms and ISI varied between 500 and 800 ms. Periodic and non-periodic sounds characterized by formant structure were perceived as vowels, while those without formant structure (both periodic and non-periodic ones) were perceived as noise. We localized the auditory cortex responses using individual MRI and distributed source modeling. To reveal the effects of periodicity, ‘vowelness’, or their combination on neural activity (differential responses), we subtracted the response evoked by the control stimuli from the response to respective test stimuli.

Results: All types of sounds evoked typical ‘child-specific’ transient auditory components (Pm100, Nm200), followed by a ‘negative’ sustained field (SF). In both ASD and TD groups, the presence of periodicity and/or formant structure enhanced the sustained negative source current in auditory cortical areas. This sustained differential response started earlier than 100 ms after stimulus onset and lasted for at least 300 ms (for ‘vowelness’) or longer (for periodicity). In children with ASD, the negative differential responses to ‘vowelness’ and periodicity in both hemispheres were atypically reduced in 100-200, 200-300 and 300-400 ms intervals. In the left hemisphere, higher amplitudes of differential responses to periodic and non-periodic vowels predicted higher IQ in children with ASD.

Conclusions: Processing of vowel periodicity and formant structure in the auditory cortex is impaired in children with ASD already at a preattentive level. This neurophysiological deficit may affect phonetic perception and speech tracking in noisy environments in children with ASD.
411.131 (Poster) Autism Symptom Severity, Adaptive Behavior, and Cognitive Functioning Associated with Inattention, Noncompliance, and Track Loss during Eye-Tracking: Results from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT) **N. G. Herman**, J. W. Griffin', A. Napels', K. Chawarska', G. Dawson', R. A. Bernier', N. Kleinhans', S. Jeste', S. Faia', J. Dziura', S. J. Webb', C. Sugar', F. Shic' and J. McPartland'; (1)Yale Child Study Center, Yale University School of Medicine, New Haven, CT, (2)Child Study Center, Yale University, Child Study Center, New Haven, CT, (3)Child Study Center, Yale School of Medicine, New Haven, CT, (4)Department of Psychiatry and Behavioral Sciences, Duke University Medical Center, Durham, NC, (5)Psychiatry and Behavioral Sciences, University of Washington, Seattle, WA, (6)University of Washington, Seattle, WA, (7)Children's Hospital Los Angeles, Los Angeles, CA, (8)Boston Children's Hospital, Boston, MA, (9)Yale University, New Haven, CT, (10)University of California, Los Angeles, Los Angeles, CA, (11)Center for Child Health, Behavior and Development, Seattle Children's Research Institute, Seattle, WA, (12)Child Study Center, Yale Child Study Center, New Haven, CT

Background: Eye-tracking technology provides researchers with an objective measure of visual attention that can be used to study social attention in autism spectrum disorder (ASD). While eye-tracking is noninvasive and easily deployable in neurodevelopmental populations, inattention and noncompliance can reduce data quality and increase attrition. Studies routinely exclude individuals who display high rates of data loss (Gaigg et al., 2020; Chawarska et al., 2012), reducing the generalizability of findings to the broader autism population. There are limited studies, however, that examine inattention and noncompliance during eye-tracking as a variable of primary interest.

Objectives: The current study aimed to (1) evaluate whether the number of breaks taken during eye-tracking was dependent on diagnostic group (typically developing (TD) vs. ASD); and (2) evaluate the relationships among social function and the number and type of breaks taken during eye-tracking.

Methods: As part of the Autism Biomarkers Consortium for Clinical Trials (ABC-CT), 278 autistic children (23.4% female; M=8.54, SD=1.64 years) and 117 TD children (30.7% female; M=8.51, SD=1.62 years) completed a battery of five passive viewing eye-tracking tasks, the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2), and the Differential Ability Scales (DAS-II); Adaptive social function was measured with the Vineland Adaptive Behavior Scales, Third Edition (VABS-3). During eye-tracking tasks, participants received experimenter-mediated breaks when the eye-track was lost (recalibration break), when a participant exhibited noncompliant behaviors (noncompliance break), or when a participant exhibited compliant behaviors but were not attending to the screen (inattention break). The number of each break type was recorded for each participant. To handle this count data with excessive zeros, we used a zero-inflated Poisson regression model to examine how autism symptom severity, adaptive behaviors, and neurocognitive measures predicted the number and type of breaks taken during eye-tracking.

Results: Compared to their TD peers, autistic participants received a greater average number of recalibration (ADOS=1.18; TD=0.72), noncompliance (ADOS=2.46; TD=0.98), and inattention breaks (ADOS=1.12; TD=0.50) during eye-tracking. Across participants, the number of breaks was associated with lower overall adaptive functioning (b=-0.72, se=.13, p<.001) and full-scale IQ scores (b=-0.02, se=.02, p<.001). Higher ADOS-2 scores were associated with a greater number of overall breaks (b=0.11, se=.02, p<.001).

Conclusions: The results suggest that adaptive functioning, IQ, and autism severity predict the number of breaks received during eye-tracking assays. These findings encourage the systematic use of breaks in eye-tracking protocols for autistic participants, especially in cases where the eye-tracking task may be sensitive to participant inattention or noncompliance. Future research should explore how the use of experimenter-mediated breaks during eye-tracking procedures can be used to decrease overall data loss in autism research.

411.132 (Poster) Biological Motion Perception in Autism Spectrum Disorder: Developing an Analytic Approach to Eye Tracking Data **L. N. Kirsch**, T. Smith', C. W. Brune', E. V. Ocampo', L. Hermle', E. F. Dillon', L. V. Soorya' and E. T. Crehan'; (1)Child Study and Human Development, Tufts University, Medford, MA, (2)Department of Psychiatry, AARTS Center, Rush University Medical Center, Chicago, IL, (3)Department of Psychiatry, Rush University Medical Center, Chicago, IL, (4)Center for Autism and Related Disorders, Autism Assessment, Research, Treatment, and Services (AARTS) Center at Rush, Baltimore, MD, (5)Eliot-Pearson Department of Child Study & Human Development, Tufts University, Medford, MA

Background: In order to improve accuracy and equitability of Autism Spectrum Disorder (ASD) assessment and diagnosis, eye tracking has been suggested as a clinical tool. An accessible, indirect measure of neural activity, gaze behavior captured by eye tracking paradigms can provide key insights into cognitive patterns. The biological motion paradigm in which participants view point-light movement made by living beings illustrates this potential. Typically developing individuals preferentially attend to biological motion in infancy while individuals with autism often do not. By examining gaze behavior in the viewing of biological and non-biological motion, clinicians may be able to identify patterns indicative of ASD, potentially even correlating with severity or clinical presentation.

Objectives: Eye tracking data require substantial analysis in order to extract meaning from tens of thousands of individual eye movements. There is currently no standardized course of analysis for this data. We sought to develop an analytic approach, systematically extracting meaningful patterns in gaze behavior that may be unique to an autistic population.

Methods: We developed an analysis of eye tracking data based on a comprehensive literature review of current practices in both eye tracking and neuroimaging research. Our methodological review led us to a comprehensive, four-part analysis involving number of
Background: People are exposed to information every day. Categorization and categorical perception (i.e., discrimination sensitivity across categories) are essential processes to organize this information efficiently. Individuals with Autism Spectrum Condition (ASC) are suggested to experience difficulties with categorization, which may fit with accounts of enhanced ability to discriminate and reduced ability to generalize in ASC. However, studies empirically investigating categorization, discrimination, and generalization in ASC have mainly focused on one process at a time, and typically using only behavioral or neural measures.

Objectives: We aim to pinpoint these perceptual processes in adults with and without ASC by presenting them with an artificial multidimensional stimulus space. This allows us to investigate to what extent they (1) naturally discriminate between different instances of the space, (2) can be trained to categorize instances of this space, (3) discriminate between these different instances after category training, and (4) generalize trained categorization to an extended version of the stimulus space and a new stimulus space. In addition, by using Fast Periodic Visual Stimulation during electroencephalography (FPVS-EEG) measures, we can add a direct, non-task related neural index to standard behavioral tasks.

Methods: The experiment was completed by 29 adults with ASC and 28 neurotypical (NT) individuals. First, we assessed baseline discrimination ability by using FPVS-EEG measures and a complementary behavioral discrimination task. Throughout the FPVS-EEG, we presented a series of base stimuli periodically interleaved with a parametrically modulated oddball stimulus. Second, participants were trained to categorize the stimuli into 2 groups. This training consisted of 3 blocks with increasing categorization difficulty. Third, participants again completed the neural and behavioral discrimination measures. Fourth, participants performed a categorization task involving an extension of the trained stimulus set and a new stimulus space with similar properties to investigate generalization.

Results: Before training, results of the NT participants immediately revealed a tuning of discrimination, unlike ASC participants who showed highly similar discrimination across the space (Fig. 1A). During training, both participants with and without ASC were able to complete the different categorization blocks. However, in the initial phase of training, ASC participants seemed more uncertain and less precise (Fig. 1B). After training, ASC participants showed a significant effect of discrimination sensitivity across the category boundary with an even narrower tuning than NT (Fig. 1A). Finally, generalization of category learning within the same stimulus space was similar for both groups. However, transfer of the category learning to the new stimulus space seemed again more uncertain and less precise for the ASC participants (Fig. 1C).

Conclusions: Our findings indicate that both individuals with and without ASC are able to categorize highly similar stimuli and to generalize this categorization after training. In the initial stages of training and in generalization to a different stimulus space, individuals with ASC seemed more uncertain and less precise. Finally, category learning significantly enhanced the sensitivity of categorical perception in participants with ASC compared to NT participants. This multi-level approach sheds light on the mechanisms that underlie information processing issues in ASC.

Results: Initial results show an overall lack of preferential attention to biological motion across participants. Interestingly, the time course analysis unveiled an additional pattern in the viewing of this paradigm: an initial preference for non-biological motion that subsides across the experiment, which appears as a preference for biological motion by the final third.

Conclusions: Developing this analysis laid a promising approach to integrating eye tracking into intervention research targeting early-social cognitive skills. Our results are in line with previous research differentiating individuals with and without ASD on a biological motion paradigm. Further, they showed the potential for obtaining quantitative, nuanced metrics of learning during a brief (5-min) evaluations. The time-course analysis has potential to provide more objective judgements during evaluations and provide a nuanced tool to measure change in clinical trials.
Objective. To evaluate established hypotheses related to learning-via-imitation in autism

Methods. Literature review identified several hypotheses related to the role of imitation in autism. The Simons Powering Autism Research for Knowledge (SPARK) database contains questionnaire data around a variety of features of autism for 10,000s of individuals with autism. Items from the SPARK data dictionary were investigator-selected to fit theoretically specified constructs (Imitation, Social Skills, Social Withdrawal, Motor Skills). Symbolism was computed as the joint variance space of Verbal Language, Non-Verbal Communication and Imitative Play constructs. Covariates included age, sex and simplex vs. multiplex family history. We selected cases from the SPARK database based on absence of missingness for all studied items. Directed causal graphs of the hypotheses were evaluated using Kendall’s tau, with an eye to falsifying theoretically entailed relationships. Direction of associations was assessed through tests of conditional independence.

Results. N=11,673 children with autism. Because Mostofsky & Ewen posed a single mechanism for the learning of social skills and motor skills, a correlation between the two skill domains was expected but not found in the data (r=0.003; p=0.62). Moreover, conditioning on Imitation actually increased the effect size of the Social-Motor correlation, providing additional evidence that imitation ability is not a common cause of social and motor skill. Examining Rogers & Pennington’s model, Social Withdrawal, Motor Skill and Symbolism correlated to a reasonable degree with each other (0.12<r<0.41). However, conditioning on Imitation did not substantially reduce the strength of the correlations (0.09<r<0.35; ps<0.05), suggesting that imitation ability is a negligible cause of the variation in these abilities. Finally, in testing Baron-Cohen’s account, we used Social Skill as a proxy of metarepresentation (as it is also hypothesized to be downstream of metarepresentation, though in an independent pathway to Symbolism/Imitation). The large degree (77%) to which Symbolism mediates the relationship between Social Skill and Imitation is consistent with Baron-Cohen’s model.

Conclusions. Our results were inconsistent with two theories positing imitation as a learning mechanism for clinically-relevant skills in autism. Baron-Cohen’s model positing imitation ability as downstream of symbolism was not falsified, though the current results are also consistent with other causal relationships between constructs.

Background: Imitation is an ability used by humans both to enhance reciprocity during social interaction and to learning a wide variety of skills. At least two hypotheses propose how imitation may support the learning of skills relevant to the autism phenotype. Mostofsky & Ewen (2011) proposed that autism-related differences in learning and expression of motor skills is due to the same, imitation-dependent mechanism as differences in the learning and expression of social skills. Rogers & Pennington (1991) theorized that imitation differences cause autism-related alterations of symbolic expression and motor function as well as social withdrawal. Alternatively, Baron-Cohen (1988) hypothesized that differences in imitative behaviors were a consequence of differences in symbolic processing, which were in turn a consequence of metarepresentational differences. To our knowledge, these various hypotheses have not been tested in direct competition using the same dataset.

Objectives: To evaluate established hypotheses related to learning-via-imitation in autism

Methods: Literature review identified several hypotheses related to the role of imitation in autism. The Simons Powering Autism Research for Knowledge (SPARK) database contains questionnaire data around a variety of features of autism for 10,000s of individuals with autism. Items from the SPARK data dictionary were investigator-selected to fit theoretically specified constructs (Imitation, Social Skills, Social Withdrawal, Motor Skills). Symbolism was computed as the joint variance space of Verbal Language, Non-Verbal Communication and Imitative Play constructs. Covariates included age, sex and simplex vs. multiplex family history. We selected cases from the SPARK database based on absence of missingness for all studied items. Directed causal graphs of the hypotheses were evaluated using Kendall’s tau, with an eye to falsifying theoretically entailed relationships. Direction of associations was assessed through tests of conditional independence.

Results: N=11,673 children with autism. Because Mostofsky & Ewen posed a single mechanism for the learning of social skills and motor skills, a correlation between the two skill domains was expected but not found in the data (r=0.003; p=0.62). Moreover, conditioning on Imitation actually increased the effect size of the Social-Motor correlation, providing additional evidence that imitation ability is not a common cause of social and motor skill. Examining Rogers & Pennington’s model, Social Withdrawal, Motor Skill and Symbolism correlated to a reasonable degree with each other (0.12<r<0.41). However, conditioning on Imitation did not substantially reduce the strength of the correlations (0.09<r<0.35; ps<0.05), suggesting that imitation ability is a negligible cause of the variation in these abilities. Finally, in testing Baron-Cohen’s account, we used Social Skill as a proxy of metarepresentation (as it is also hypothesized to be downstream of metarepresentation, though in an independent pathway to Symbolism/Imitation). The large degree (77%) to which Symbolism mediates the relationship between Social Skill and Imitation is consistent with Baron-Cohen’s model.

Conclusions: Our results were inconsistent with two theories positing imitation as a learning mechanism for clinically-relevant skills in autism. Baron-Cohen’s model positing imitation ability as downstream of symbolism was not falsified, though the current results are also consistent with other causal relationships between constructs.
Results:

The classroom observation total score demonstrated good preliminary evidence of construct validity, as it had good correlation with the Swanson, Kotkin, Agler, M-Fllyn, and Pelham Scale (SKAMP; Swanson, 1992), a validated teacher-report measure of classroom-observed ADHD and EF-related behaviors in which higher scores represent greater challenges ($r = .44, p < .001$).

Overall, autistic students demonstrated fairly similar EF strengths and weaknesses as children with ADHD. There were no significant differences between the groups on demonstrating reciprocity, following rules, transitioning appropriately, avoiding negativity/overwhelm, or participating in class. Autistic children were rated as significantly more likely to get “stuck” during the observation than were their ADHD peers ($p = .037$). In a multiple linear regression predicting child total EF score that controlled for student characteristics of IQ, age, and household income, diagnosis was not significant ($F = 0.91, p = .46$).

Observations of teachers indicated that the majority of teachers (> 75%) demonstrated good planning, clear instructions, and use of visuals. However, far fewer teachers (< 30%) utilized favorable praise to correction ratios, primed students for transitions, demonstrated flexibility, reminded students of rules, or used a behavioral reward system.

Conclusions:

Similar EF profiles between autistic students and those with ADHD indicate they may benefit from similar types of accommodations and supports. Low teacher scores on EF-supporting practices indicate that teachers may need more training on the importance of these skills for children with ASD or ADHD to support inclusion classrooms. Further study is needed to determine the nature of the relationship between teacher and student EF skills.

411.136 (Poster) Configuration Does Not Affect the Allocation of Visual Attention to Foreground and Background Information Differently for Persons with Autism and Neurotypical Persons on a Change Detection Study


Background: Among their unique styles of attending, individuals with autism spectrum (ASD) appear to prioritize the processing of local – detailed information rather than the overall global structure of visual information (Evers et al., 2018; Plaisted et al., 1998). This style is thought to be associated with greater efficiency when attending to certain stimuli in the visual field (Burack & Brodeur, 2020; Mottron & Burack, 2001; Mottron et al., 2006), and superior abilities in detecting change in complex dynamic environments (Karaminis et al., 2020; Rensink, 2002). Although the research on change detection in ASD is mixed, the discrepancies are largely attributed to the diversity of the stimuli in our environment and the specific components of perception, attention, and cognition involved on the task (Hochhauser et al., 2018; Maccari et al., 2014; Rensink et al., 2002).

Objectives: The current study was focused on the abilities of individuals with autism, as compared to neurotypical (NT) individuals, to detect changes occurring within a simple static visual display at the local versus global level in the foreground and background aspects of a visual scene. Consistent with models of enhanced local perception, we expected that the participants with ASD would be better at detecting changes for local rather than global displays and better at detecting changes in the background than foreground compared to NT individuals.

Methods: Thirty-two individuals (2 female) aged 12 to 33 years with formal diagnoses of autism and 32 with no diagnoses (2 female) participated in the current study. The groups were match on chronological age ($M_{age\_autism} = 20.2, SD = 6.1, M_{age\_NT} = 19.7, SD = 6.2$) and perceptual IQ ($IQ_{autism} = 106.7, SD = 11.2, IQ_{NT} = 109.0, SD = 9.7$). In the change detection task, coloured rectangles displayed vertically in the background and horizontally in the foreground were presented in an organized configuration to simulate global processing or unorganized configuration to simulate local processing. The participants were required to indicate with a button press whether a change had occurred. Four possible changes could occur: (1) foreground change in the organized configuration, (2) foreground change in the unorganized configuration, (3) background change with organized configuration, and (4) background change with unorganized configuration.

Results: A significant effect of change condition was observed ($F(1.18, 73.32) = 212.05, p < .001, \eta_p^2 = .77$) in which accuracy was highest for both the ASD and NT participants when detecting no change, next when detecting foreground change and least when detecting background change. No main effect was found between global and local stimuli ($F(1.62) = 1.20, p = .278, \eta_p^2 = .02$). A significant interaction ($F(1.90, 117.32) = 3.86, p = .026, \eta_p^2 = .06$) revealed that change detection of foreground features was more accurate when presented with an unorganized, rather than organized configuration, for both the ASD and the NT participants ($p = .04$).

Conclusions: The individuals with ASD performed comparably to NT individuals when detecting changes in static, simple visual displays devoid of social content, as both groups directed their attention to the foreground and detected changes more accurately for unorganized
than organized configurations. This finding provides further evidence of similar styles of attending between persons with ASD and TD persons.

411.137  (Poster) Delayed Development of Episodic Future Thinking in Adolescents with ASD: A Longitudinal Study
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Background: Autism Spectrum Disorders (ASD) is characterized by cognitive difficulties, including autobiographical memory (AM) impairments. AM corresponds to the ability to remember past experiences and to imagine possible future experiences. In ASD, AM is impaired with reduced retrieval, specificity, and elaboration, particularly in childhood. However, to date, there is no data to understand this atypical development during adolescence.

Objectives: We set up the first longitudinal study to evaluate the evolution of AM in adolescents with ASD and the factors influencing AM. We investigated the properties of past and future autobiographical productions with an objective (structured interview; From Past to Futur Task) and subjective (self-administered questionnaire; Survey of Autobiographical Memory) measurement of the AM over two years.

Methods: Twenty-six adolescents (10 - 19 years): 13 adolescents with ASD (11 males) and 13 age- and intelligence-matched controls (11 males) were followed for two years, three times, one year apart (T0, T1, and T2). For the objective measure of AM, participants were asked to free recall two past and two future autobiographical events. The content ("what", "who", and "how") and the context ("where" and "when") were evaluated. For the subjective measure of AM, items assessed self-reported future projection, episodic autobiographical, semantic, and spatial memory. The autistic severity was also measured with the Autism Spectrum Quotient (AQ).

Results: Episodic details during the projection towards the future increased during adolescence in the TD group but not in the ASD group (Fig 1). The analysis of self-questionnaires showed a lower score concerning spatial memory for the ASD group compared to the TD group. The objective evaluation confirmed this difficulty in remembering the spatial and temporal context. Exploration of event details revealed a significant increase of elements related to the content for both groups but without any change for the contextual elements in the ASD group. Finally, we showed that AM evolution in ASD was influenced by age and autistic traits (social skills, switching, imagination, and attention to detail, measured by the AQ).

Conclusions: AM is affected in a heterogeneous way in ASD development, with the progressive development of past event recall abilities, linked to the severity of the symptoms. However, through adolescence, we highlighted persistent difficulties of projection into the future and spatial memory. Recall past experiences would require lower cognitive and executive resources than imagining possible future experiences, which would slow down its development. Based on our results, we propose that difficulties in spatial memory and imagination impact the construction of mental scenes and then could impair the self-projection as well as into the future, but also in spatial navigation and toward others (i.e., theory of mind). Finally, given the difficulties in reporting contextual details ("where" and "when"), we could hypothesize that the AM organization in ASD could be different from neurotypical. Not according to a personal "timeline” but rather according to personal themes or concepts, linked to a more preserved semantic memory.

411.138  (Poster) Developmental Trajectories of Visual Disengagement during Early and Middle Childhood in Autistic Children
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Background: The ability to disengage and look away from captivating stimuli is an essential component of attentional orienting, and undergoes dramatic developments during infancy. Deficits in orienting to social and non-social stimuli have been described as one of the earliest signs to emerge in very young children with Autism Spectrum Disorder (ASD). There is ample evidence that children take more time to disengage attention than adults, and that the attentional system becomes more efficient during childhood and adolescence. Yet, its precise developmental trajectory during early and middle childhood for both typically developing (TD) and autistic children remains to be defined.

Objectives: To characterize the spatiotemporal accuracy of visual disengagement in both ASD and TD populations, its developmental trajectory and its putative association with autistic symptomatology.

Methods: Eye-tracking is a powerful technique to measure attentional switching in young children. A total of 37 ASD and 69 TD children took part in the study, all between 2 and 9 years of age. The ‘gap-overlap’ task is a well-established paradigm to measure flexibility in attentional orienting from a central (CS) to a peripheral stimulus (PS) presented unpredictably. We analyzed the efficiency of disengaging from CS to orient to PS derived from saccadic reaction times, and compare it between groups and across ages. We also evaluated the spatial distribution of the saccade landing position for each group and condition.
Results: We found that the latency for visual disengagement was reduced with age in TD children, being shorter in middle compared to early childhood. However, no changes were observed across ages in ASD children. Furthermore, we confirmed that ASD children exhibit a greater variability in the landing accuracy of the saccade to the PS, compared to TD children.

Conclusions: Our results indicate a less accurate visual disengagement in ASD compared to TD children, as well as a differential developmental trajectory. These findings provide additional evidence that the attentional system becomes more efficient with age, but that this process is altered in ASD population. We believe that these deficits in early-developing attentional control might have a far-reaching impact on cognitive skills.

411.139 (Poster) Distinct Attentional, Perceptual, and Neural Phenotypes in Autism and First-Degree Relatives: Neurocognitive Insights from a Multi-Method, Family Study of Visual Perception and Attention


Methods:

Participants included 32 autistic individuals (ASD) and 56 parents of autistic individuals (ASD parent), and 30 and 43 respective age- or IQ-matched controls. Top-down social attention was assessed with a suite of dynamic analytical methods (e.g., growth curve analyses, perseverative/regressive refixations) applied to eye-tracking data captured during presentation of a social-emotional scene, characterizing where and how participants looked. Two interactive match-to-sample tasks using illusions were administered on an eye-tracker to examine bottom-up visual processing that potentially underlies top-down social attention. Local/global perceptual (e.g., first fixations, fixation location within illusion) and strategy-based (e.g., vacillating fixations, match/non-match fixations) gaze composite scores were generated. Finally, event-related potentials (i.e., time-locked EEG responses to illusion and non-illusion stimuli), including P1, N1, and N2 components, were extracted to assess neural correlates of local/global processing.

Results: Compared to controls, both ASD and ASD parent groups showed reduced social attention over the course of the task, with a linear decrease and a dynamic looking pattern (Fig 1A; i.e., shifting away earlier and later from looking at social information). Both groups also exhibited more refixations toward non-salient, background objects. Autistic individuals demonstrated a greater local versus global visual perceptual and strategic style (Fig 1B). Parent groups differed in strategy-based measures of eye tracking, but not perceptual-based indices (Fig 1B). Finally, atypical N1 amplitudes in the occipital-parietal region were found in autistic individuals, with observable opposite patterns of neural responses occurring in the N2 component in both the ASD and ASD parent groups (Fig.1C). Social attention, and local/global gaze and neural components were related to (sub)-clinical features of the ASD phenotype.

Conclusions: Results of this study provide compelling evidence of disruptions in global perception potentially impacting top-down social attention in autistic individuals and, more subtly, in their parents. Fine-grained eye-tracking variables examined are thought to effectively tap different aspects of underlying cognition, revealing key mechanistic insights into the roots of social functioning differences in autism. Findings of fundamental local/global visual processing differences identified behaviorally (gaze) and neurally point to underlying neurobiological differences shaped by autism-related genetic variation. Brain-behavior relationships with (sub)clinical features in autism and parents support the utility of social/non-social visual perception/attention as key neurocognitive phenotypes that may be fruitfully applied in future treatment and genetic studies.

411.140 (Poster) EARLY Numerical Skills and Mathematical Domains in Students with Autism Spectrum Disorders in Primary School.


Participants included 32 autistic individuals (ASD) and 56 parents of autistic individuals (ASD parent), and 30 and 43 respective age- or IQ-matched controls. Top-down social attention was assessed with a suite of dynamic analytical methods (e.g., growth curve analyses, perseverative/regressive refixations) applied to eye-tracking data captured during presentation of a social-emotional scene, characterizing where and how participants looked. Two interactive match-to-sample tasks using illusions were administered on an eye-tracker to examine bottom-up visual processing that potentially underlies top-down social attention. Local/global perceptual (e.g., first fixations, fixation location within illusion) and strategy-based (e.g., vacillating fixations, match/non-match fixations) gaze composite scores were generated. Finally, event-related potentials (i.e., time-locked EEG responses to illusion and non-illusion stimuli), including P1, N1, and N2 components, were extracted to assess neural correlates of local/global processing.

Results: Compared to controls, both ASD and ASD parent groups showed reduced social attention over the course of the task, with a linear decrease and a dynamic looking pattern (Fig 1A; i.e., shifting away earlier and later from looking at social information). Both groups also exhibited more refixations toward non-salient, background objects. Autistic individuals demonstrated a greater local versus global visual perceptual and strategic style (Fig 1B). Parent groups differed in strategy-based measures of eye tracking, but not perceptual-based indices (Fig 1B). Finally, atypical N1 amplitudes in the occipital-parietal region were found in autistic individuals, with observable opposite patterns of neural responses occurring in the N2 component in both the ASD and ASD parent groups (Fig.1C). Social attention, and local/global gaze and neural components were related to (sub)-clinical features of the ASD phenotype.

Conclusions: Results of this study provide compelling evidence of disruptions in global perception potentially impacting top-down social attention in autistic individuals and, more subtly, in their parents. Fine-grained eye-tracking variables examined are thought to effectively tap different aspects of underlying cognition, revealing key mechanistic insights into the roots of social functioning differences in autism. Findings of fundamental local/global visual processing differences identified behaviorally (gaze) and neurally point to underlying neurobiological differences shaped by autism-related genetic variation. Brain-behavior relationships with (sub)clinical features in autism and parents support the utility of social/non-social visual perception/attention as key neurocognitive phenotypes that may be fruitfully applied in future treatment and genetic studies.
Background: In recent years, there has been a growing interest in providing a quality educational response to the needs of children with ASD. Mathematics is one of the main subjects were children with ASD present difficulties, manifesting themselves in four domains: number sense, number facts, procedural calculation, or mathematical reasoning. However, studies on mathematics and ASD are scarce, and provided mixed results.

Objectives: To this end, we conducted a study to explore the effect of early symbolic and non-symbolic numerical competencies in children with ASD as predictors of mathematics domains in Primary Education compared to typically developing children.

Methods: Forty-two children (21 children with high-functioning ASD and 21 typically developing children) from Primary Education participated in the study (mean age ASD= 9.54, SD = 1.75; mean age TD = 9.49, SD = 1.84). Assessments were conducted in 50-minute sessions with each participant. Four early numerical competencies were tested: verbal subitizing, counting, magnitude comparison, and projection. Two domains of mathematics were used as outcome variables: procedural calculation, and word/language problems. Control tasks such as Word and pseudoword reading (PROLEC-R), Digits (WISC-IV), Corsi Cubes, Manual speed, and Executive control (Go-NoGo) were also included.

Results: Significant differences were found between children with ASD and TD only in the first years of Primary Education in subitizing ($p = 0.010$) and projection ($p = 0.032$) tasks. No differences were found in the last years of Primary Education. In the group of children with TD almost all mathematical skills were significant predictors for calculation, while for children with ASD significant predictors were only found in the counting (F (5.697), $p = .033$) and magnitude comparison (F (14.076), $p = .002$) tasks for the calculation domain. However, nonsymbolic magnitude comparison tasks (F (8,486), $p = .012$) were predictors of problem solving only in this group.

Conclusions: The results suggest similar numerical processing between children with and without ASD, although in those with ASD the correlations were higher in tasks whose processing is purely nonsymbolic, while in the TD group the correlation is higher in symbolic tasks. This seems to indicate that, although the results in the mathematical domains are similar, early numerical skills affect in different ways (such as subitizing for example) to both groups. However, these differences are significantly reduced with age, indicating that both groups had a similar development in the last years of Primary Education. Future research should increase the sample for each year of Primary Education and to use longitudinal studies, studying in greater detail why subitizing ability is better in children with high-functioning ASD, and why it disappears as children's age increases.

411.141 (Poster) Examining Visual Processing of Hierarchical Figures through Behavioral Measures and Pupillometry in Relation to Autistic Traits in Adults

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Background: Although studies of global (i.e., gist) and local (i.e., detail) processing in autism spectrum disorder (ASD) are often contradictory, they converge to show slowed global processing in ASD (see Van der Hallen, et al., 2015). One potential source of inconsistency may arise from low-level vision confounds when using traditional hierarchical figures (see Brown & Crewther, 2017). Additionally, behavioral measures alone may be too insensitive to detect differences (see Samson et al., 2012) and do not directly address underlying mechanisms.

Objectives: The current study aims to examine global/local processing in non-autistic adults with varying levels of autistic traits through measures of behavioral (i.e., reaction time) and pupillary responses, using highly controlled stimuli to begin considering attentional mechanisms as an underlying factor.

Methods: The final sample included 54 undergraduates ($M_{age} = 25.3$ years, $SD = 8.1$). Gaze and pupil diameter were recorded with an SR EyeLink 1000 Plus eye-tracker while participants completed global and local hierarchical figure tasks (adapted from Campana et al., 2016). Reaction time (RT) was recorded through button presses. Participants were told they would see homogeneously-oriented local lines defining a rectangular global shape within the stimulus. Participants completed alternating blocks of global and local orientation identification trials, and then filled out the Social Responsiveness Scale, Second Edition (SRS-2; Constantino & Gruber, 2012) to assess levels of autistic traits.

Results: Using a cutoff SRS-2 T-score of 59, participants were separated into groups low ($N=39$) and high ($N=15$) on autistic traits. Two-by-two mixed-model ANOVAs were used to examine effects of condition (global, local) and traits group (high, low) on RT and pupil diameter. In examining RT, there was a significant condition effect ($F(1,52)=23.49, p<.001$), with participants generally responding faster in the global than local condition, and a significant interaction between condition and group ($F(1, 52)=4.37, p=.042$), with the low-traits group significantly faster to report the global as compared to the local orientation ($p<.001$), but no difference between conditions for the high-traits group was found ($p=.111$; see Figure 1). Pupil analyses revealed a marginal condition effect, with greater pupil dilation in the...
global than local condition, $F(1, 49)=3.74, p=.059$. This was related to a marginally significant condition by group interaction, $F(1, 49)=3.34, p=.074$, with pairwise comparisons showing significantly more dilation in the global compared to the local condition for the high-traits group ($p=.034$), but no condition difference for the low-traits group ($p=.91$; see Figure 2).

Conclusions: We found that non-autistic adults with low levels of autistic traits were faster to identify global-level information as compared to local-level information, while adults with high levels did not differ in timing to identify global compared to local information. Further, high-traits adults also showed more pupil dilation in identifying global compared to local information, while low-traits adults showed no pupil response differences between conditions. These findings suggest potentially different strategies for global/local processing depending on features of the broad autism phenotype, possibly facilitated by visual attention differences. Future work will investigate how autistic traits might relate to differences in pupil response trajectories.

411.142 (Poster) Inhibition Challenges Relate to Maladaptive Sleep Outcomes in Autistic Preschoolers
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Background: Autistic children are commonly reported to have impaired behavioral inhibition (Cremone-Caira et al., 2021). Sleep problems, namely bedtime resistance and sleep anxiety, are also prevalent among the autistic community (Hodge et al., 2014; Mazurek et al., 2015). Emerging evidence suggests that poor sleep negatively relates to the development of executive functions including inhibition (Turnbull et al., 2013). To date, however, relations between inhibition challenges and sleep difficulties have not been characterized in preschool-aged children with a diagnosis of autism spectrum disorder (ASD). As the preschool years are a critical period of cognitive development and sleep transitions, further research in this age group is needed.

Objectives: Our goal was to characterize relations between behavioral inhibition and sleep problems among preschool-aged children with ASD and age-matched neurotypical controls (NTC).

Methods: As part of a larger study charting the development of executive function in ASD preschoolers, data were collected from preschool-aged children with and without a diagnosis of ASD and their caregivers. Children completed a battery of age-appropriate assessments that measured behavioral inhibition. Specifically, behavioral inhibition was operationalized as a composite score calculated across the A-not-B, Grass Snow, and Tricky Box tasks. Standardized clinical assessments were used to confirm child diagnostic status (ADOS-2, ADI-R) as well as caregiver-report of sleep problems (Child Sleep Habits Questionnaire for Toddlers; CSHQ-T; Goodlin-Jones et al., 2008).

Results: Behavioral inhibition was more impaired in ASD preschoolers relative to NTC ($F(1,153) = 43.178, p < 0.001, \eta^2 = 0.220$). Likewise, bedtime resistance ($F(1,76) = 15.830, p < 0.001, \eta^2 = 0.172$) and sleep anxiety ($F(1,75) = 10.591, p = 0.002, \eta^2 = 0.124$) were both greater in the ASD compared to the NTC group. Behavioral inhibition was significantly, positively correlated with bedtime resistance in ASD preschoolers ($n = 46, r = 0.294, p = 0.048$) but not NTC ($n = 29, r = 0.061, p = 0.752$). Sleep anxiety was also marginally, positively correlated with inhibition in the ASD group ($n = 45, r = 0.281, p = 0.061$) but not in the NTC group ($n = 29, r = 0.049, p = 0.800$). Bedtime resistance and sleep anxiety were significantly, positively correlated in both groups ($rs > 0.681, ps < 0.001$).

Conclusions: Collectively, the results of these analyses replicate previous findings highlighting inhibition difficulties and sleep problems in young, autistic children. Notably, inhibition challenges were only related to sleep problems in our ASD group. Although correlational, this finding suggests that sleep problems may negatively affect domains of executive function among young children with a diagnosis of ASD. Alternatively, it is possible that inhibition challenges may impede sleep. For example, bedtime resistance may reflect an inability to inhibit distractors in the sleep environment or internal thoughts related to sleep anxiety. Future research is needed to empirically test these hypotheses related to causality as well as the directionality of the relations identified in our analyses. Together with the findings presented here, additional work may identify targets for intervention to improve executive functioning and/or sleep among autistic preschoolers.

411.143 (Poster) Learning Strong Vs. Weak Multi-Cue-Outcome Associations By Autistic and Non-Autistic Adults
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Background: Bayesian and predictive coding models have recently been proposed to understand autism. While the specifics differ, the models generally predict differences in learning probabilistic cue-outcome associations (i.e., associations that are not deterministic) among autistic and non-autistic individuals. Empirical evidence for this, however, is mixed. Moreover, previous studies tend to use simple cues (e.g., learning to associate one of two coloured boxes to an outcome), which is unlike in real life where there may be many cues and the cues in tandem may be associated with the outcome.

Objectives: We compared autistic and non-autistic individuals on learning cue-outcome associations that require integration of multiple cues. The associations were either unambiguous (strongly predictive) or ambiguous (weakly predictive).
Methods: Autistic and non-autistic adults (n=52 in each) completed a multi-cue probabilistic learning task online, in which they were asked to predict whether each one of 16 unique art pieces received a high or low rating from an art critic. Each art piece was composed of a combination of four binary cues: background colour (orange/purple), orientation (left/right), dot colour (black/white), and number of dots (3/6), and was associated with a probability of receiving a high rating. Half of the art pieces had a probability within the range of 0.1-0.2 or 0.8-0.9 (“unambiguous”) whereas the other half had a probability in the range of 0.4-0.6 (“ambiguous”). On every trial, the probability was compared to a random number between 0-1 to determine if the art piece received a high rating; if the random number was lower than the associated probability, then a high rating was the ‘correct’ answer. Trial-by-trial feedback was provided after each response. The 16 unique art pieces were repeated 8 times, resulting in a total of 128 trials. We compared performance of unambiguous and ambiguous art pieces during the first half (“early”) and the second half (“late”) of the task.

Results: Using a binomial mixed effects model to examine accuracy in learning performance, we investigated whether the learning of unambiguous vs. ambiguous associations differed among autistic vs. non-autistic during early vs. late phase. Our model revealed a significant interaction such that for unambiguous (strongly predictive) associations, performance was similar among autistic and non-autistic participants during both early and late phases, whereas for ambiguous (weakly predictive) associations, performance was similar between the groups during the early phase, but non-autistic participants outperformed autistic participants in the late phase (see Figure 1).

Conclusions: Compared to non-autistic individuals, autistic individuals do not show differences in learning associations that require integrating multiple cues when the associative strength is relatively strong, but they do when the cue-outcome associations are weak. The findings thus support the suggestion that autistic individuals may have higher inflexible precision of prediction error, treating every unreliable feedback as meaningful when it should be ignored. Given that many real-life social situations are complex and thus governed by weak cue-outcome associations, this may partly explain the challenges autistic individuals face in such situations.

411.144 (Poster) Reading Ability of English Language Learners with Autism
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Background: As the percentage of children diagnosed with autism continues to rise (CDC, 2020), so do the percentages of students with diverse language needs in the United States. Additionally, over 60% of reported diagnoses of autism are from ethnic minority families, families whose primary home language may not be English. While there are proven benefits associated with multiple language exposure, children with autism in multilingual families are often denied the opportunity to receive reading intervention in their native language.

Objectives: We examine the reading performance of elementary-age children with autism who are language learners through two research questions. RQ1) How do rates of English to Speakers of Other Languages (ESOL) participation differ between students with autism and typically developing (TD) students across grades 1, 3, and 7? RQ2) Are there differences in literacy skills for students with autism across English Learner (EL) groups?

Methods: To assess trends of ESOL enrollment between autism and TD groups, a regression was used to examine progression of EL/ESOL membership through grades 1, 3, and 7. An ANOVA examined the literacy skills of children with autism in grades 1 (n=6,680), 3 (n=6,231), and 7 (n=2,821). The regression includes autism diagnosis, EL status (ESOL program enrollment), and an interaction term for children who graduated from the ESOL program (former language learners).

Results: RQ1) Results from the regression support a significant difference in ESOL enrollment rates on the basis of autism status and grade level and an interaction between grade level and autism status. See the attached image for more information. RQ2) ANOVA models revealed that the impact of EL status decreased as ESOL programming progressed. Students with ASD who were identified as current ELs demonstrated greater differences to their non-EL peers in areas such as vocabulary and reading comprehension when compared to the differences between former EL (graduated from ESOL) and non-EL students. These differences in how former and current EL students compared to non-EL students becomes more pronounced at higher grade levels, as former EL and non-EL students perform similarly on measures of reading comprehension by grade 7, while significant differences remain between current EL and non-EL students.

Conclusions:

RQ1) We found that student with ASD progressed through the ESOL program at a faster rate than their TD peers. We explore possibilities for this finding, including that students with ASD could have been misidentified as ELs due to language difficulties in the early grades.

RQ2) Students with autism who are labeled current ELs perform at a lower rate than typically developing students in the EL program, suggesting that there is an added deficit of being enrolled in the EL program for students with autism that is not present for TD students. However, once students with autism exit or graduate from the EL program, that deficit is not present. However, at grade 1 students with autism who have exited the program are still underperforming their TD peers at a greater rate than students with autism and TD students who were never identified for the EL program.
Background: Most information on face-directed gaze in autism relies on participants viewing social stimuli on a computer screen. However, more recent work indicates that face-directed gaze on computer screens does not predict gaze during live interactions (Grossman et al. 2019, Foulsham, T., & Kingstone, 2017). Face-directed gaze during conversation also changes based context, such as whether the person whose gaze is being measured is listening or speaking (Ho et al. 2015). Since live gazing behavior has rarely been explored in autism, little is known about these socially important, contextually driven differences in their eye gaze.

Objectives: Identify conversational-context-dependent differences in face-directed gaze patterns of autistic and non-autistic adolescents during live interactions.

Methods: Adolescents (15 autistic, 11 neurotypical or NT) wore SMI eyetracking glasses during a conversation with two research assistants (RAs). Participant groups did not differ significantly on age, gender, verbal- non-verbal, full IQ, or Core Language scores. During the conversation, RA1 asked an on-topic, contextually appropriate question, while RA2 asked an off-topic, contextually inappropriate question. The on-topic question occurred when RA1 asked the participant whether they had seen a movie the RA had just mentioned. The off-topic question occurred when RA2 described a moment at the gym and asked the participant, “What is a time that you’ve had when it was hard to breathe?” We captured audio-video recordings of the interaction and participant gaze data. The position of the on-topic vs. off-topic RA (left or right) was alternated between participants to avoid lateralization effects. We calculated dwell time to the speaker’s face during each question as percent of overall dwell time to the participant’s full field of view.

Results: A two (diagnosis) by two (condition: on-topic vs. off-topic) repeated measures ANOVA identified a significant main effect for diagnosis ($F(1, 24) = 5.52, p < .03$, partial $\eta^2 = .19$, with the NT participants gazing at both speakers more than the autistic participants. There was also a significant main effect of condition ($F(1, 24) = 15.15, p < .001$, partial $\eta^2 = .39$), with both groups showing more gaze to the face of the on-topic than the off-topic speaker, and a significant interaction between diagnosis and condition ($F(1, 24) = 5.22, p = .03$, partial $\eta^2 = .18$), with NT participants increasing their gaze to the on-topic vs. off-topic speaker significantly more than autistic participants. Post-hoc comparisons show that NT participants have significantly more face-directed gaze during the on-topic than the off-topic question ($p = .001$), while the autistic participants show no significant difference in speaker-directed gaze between the two conditions. The NT group has significantly more face-directed gaze than the autism group during the on-topic ($p = .005$), but not the off-topic question.

Conclusions: Speaker-directed gaze patterns of autistic and neurotypical adolescents are comparable in one conversational context but diverge in another. Autistic adolescents gaze at speakers’ faces equally, regardless of the contextual appropriateness of their conversation partners' questions, while NT adolescents differentiate their visual exploration of the speakers’ face for on-topic compared to off-topic questions.
report interview, rating form, and checklist (and self-report when applicable), as well as direct tests of ABM in the form of free recall, memory cueing, and staged event procedures. The AMP was administered to a caregiver and her 11-year-old autistic son (in a single 2-hour session) to pilot/refine procedures for administration, scoring, and interpretation. A report was generated characterizing the child’s ABM including recommendations for intervention that would be suitable complements of his existing therapeutic goals and education plan.

Results: For this single case, testing using the AMP revealed 1) strength in ABM semantic memory and cued and recognition memory and 2) challenges in episodic memory (detail, specificity, spontaneity, temporal sequencing; see Table). Piloting also revealed challenges to assessment in a clinical setting that if addressed, should enhance the utility of the measure going forward.

Conclusions: The AMP appears to be sensitive for tapping a range of ABM domains and yielded a coherent portrait of ABM memory strengths and challenges. This profile was consistent with the literature on ABM in autism suggesting tentative evidence for construct validity. Initial pilot data support further development and evaluation of the AMP especially for clinical, educational, and applied purposes.

411.147  (Poster) Autistic and Non-Autistic Individuals Show Comparable Anticipation of Visual Targets: Results from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT)  
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Background: In human vision, anticipating the location of a visual stimulus allows an individual to generate an eye-movement towards the stimulus more rapidly, increasing the efficiency of perception. Saccade latency, the time it takes to initiate an eye-movement towards a stimulus after it appears, is a low-level index of anticipation that exhibits substantial interindividual variability and has been used as a marker of differences in visual-attentional processing in autistic individuals. However, previous research shows mixed evidence of anticipatory differences in autism in predominantly small samples. The current study evaluated implicit predictions about the dynamic perceptual environment in a large sample of autistic and non-autistic (NT) individuals.

Objectives: Consistent with prior research suggesting decreased anticipatory attention in autism, we predicted that autistic individuals, relative to NT individuals, would be slower to look to fixation targets presented in a fixed order across repeated blocks (i.e., have longer saccade latency) than non-autistic individuals. We also predicted an interaction between age and saccade latency, such that older participants would demonstrate more rapid saccades relative to younger participants.

Methods: We evaluated this hypothesis in data collected from 280 autistic and 119 NT children (ages 6-11) through the Autism Biomarkers Consortium for Clinical Trials (ABC-CT). As part of the ABC-CT eye-tracking battery calibration procedure, participants are presented with three identical fixation tasks in which five targets, in the corners and center of the screen, are presented in a fixed order. Target appearance is contingent on participant looking, such that when a participant fixates on a target for approximately 200ms, the experiment operator cues the next target. Latency, per block, was calculated both as the median of the saccade latency between targets and as the total time to look to all five targets. Increases in anticipation, or learning, were calculated as the slope of the best linear fit of median saccade latency across the children's rating. The AMP was administered to a caregiver and her 11-year-old autistic son (in a single 2-hour session) to pilot/refine procedures for administration, scoring, and interpretation. A report was generated characterizing the child's ABM including recommendations for intervention that would be suitable complements of his existing therapeutic goals and education plan.

Results: Across all participants, there was evidence for saccade latency to increase, rather than decrease, as a function of increasing target blocks (rho = .16, p < .001). There were no differences by diagnostic group in changes in latency across calibration blocks (p = .85). Moreover, there were no relationships between change in saccade anticipation and age or cognitive ability. Ongoing analyses are exploring the extent to which results are sensitive to variability in the interindividual quality of eye-tracking data and whether alternative saccade parsing may reveal meaningful relationships among prediction and clinical features of autism.

Conclusions: Counter to theories that posit differences in ASD and NT based on attentional disengagement and predictive deployment of attention, there were no differences identified between diagnostic groups in the current study. While results revealed substantial individual variability in low-level attentional differences (within and across groups), these differences were not related to the individual’s diagnostic status or cognitive ability. These results align with previous research hypothesizing that differences in saccade latency to social information reflect prioritization of social information rather than low-level differences in visual attention.
**429.001 (Poster)** Links between Attention to Faces of People Speaking and Language in Toddlers with and without Autism

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Background: Toddlers with ASD (Garrido, et al., 2017) and other developmental disorders (DD) (Law et al., 2004) often exhibit language delays. Although toddlers with ASD spend less time attending to faces of speakers than typically developing (TD) controls, toddlers with other DD attend to faces of speakers at levels comparable to TD controls (Chawarska, et al., 2012; Shic, et al., 2020). Considering that faces of people speaking provide a great amount of intersensory audiovisual information (co-occurring facial gestures, articulations with vocal, prosodic information) which facilitates language development in TD children (Chawarska et al., 2022; Edgar et al., 2022), we examine contribution of attention to face during speech to language in toddlers with and without ASD.

Objectives: Across five domains of math ability, we explored the relative proportions of very high and low-achieving autistic youth compared to the expected rates in the general population. Second, we asked if the relative contributions of fluid reasoning [FR], expressive language (CELF-5), and EF skills (BRIEF2).

Methods: Thirty-one autistic youth (aged 5–16 years old) completed several tests to measure math ability (KeyMath-3), FR (Raven’s Progressive Matrices), expressive language (CELF-5), and EF skills (BRIEF2).

Results: A Chi-squared test (p < .001) revealed a significantly higher proportion of autistic youth who were low achieving or high achieving (6.45% through 25.81%) in our sample compared to the expected rates in the general population across all math domains. The strongest predictor of math ability across domains was FR, accounting for between 24% and 55% of the model variance. In data analysis

**429.002 (Poster)** Mathematical Ability of Autistic Youth: What Best Explains the Heterogeneity?

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Background: Autistic individuals are often stereotyped as gifted mathematicians, and as a result, autistic traits and behaviours are generally believed to lead to superior math ability. Society’s collective understanding of autism is based on media representations, which often foster unrealistic expectations of their skills by families and teachers, leading to additional barriers for autistic students (Draaisma, 2009). This understanding is concerning, given that autistic students are more likely to have a math learning disability [LD] compared to math giftedness (Oswald et al., 2016). Studies have found several variables that influence the math achievement of autistic students. Many autistic students struggle in the upper grades when math relies more heavily upon abstract reasoning and executive functioning [EF] (i.e., working memory skills; Barnett & Cleary, 2019), both of which are relevant for math success.

Objectives: Across five domains of math ability, we explored the relative proportions of very high and low-achieving autistic youth compared to the expected rates in the general population. Second, we asked if the relative contributions of fluid reasoning [FR], expressive language, and EF differed across math domains (e.g., geometry versus algebra).

Methods: Thirty-one autistic youth (aged 5–16 years old) completed several tests to measure math ability (KeyMath-3), FR (Raven’s Progressive Matrices), expressive language (CELF-5), and EF skills (BRIEF2).

Results: A Chi-squared test (p < .001) revealed a significantly higher proportion of autistic youth who were low achieving or high achieving (6.45% through 25.81%) in our sample compared to the expected rates in the general population across all math domains. The strongest predictor of math ability across domains was FR, accounting for between 24% and 55% of the model variance. In data analysis
and measurement domains, expressive language was an additional unique predictor of math ability (accounting for between 55% and 58% of the model variance). Finally, behaviour ratings of EF were not a significant predictor of math ability.

Conclusions: Our findings challenge prevailing stereotypes of an autistic advantage in math and emphasize the need to understand the unique strengths and needs of autistic students. While FR and language are known to be significant predictors of math ability in non-autistic youth, this study explicitly investigated and confirmed that FR and, to a lesser extent, language skills are contributors to autistic students’ ability across math domains. Although EF was not a predictor of math ability, researchers have shown it appears to be an important predictor when students solve complex math problems (not included in our subtests) using specific EF skills. To address the limitations of the BRIEF2, future research should consider using direct measures and investigate the role of EF in math problem-solving.

The belief that autistics are highly talented mathematicians, engineers, and scientists fails to account for autistic youth with a math LD. This study highlights the importance of promoting more accurate representations of math ability distribution across autistic youth. By understanding which variables best predict math achievement, educators can develop new, concrete strategies to ensure autistic students receive the necessary resources and support to succeed in math.

429.003 (Poster) Measuring the Relationship between Multilingual Exposure and Executive Functioning in Preschool Age Children with Autism

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Background: Multilingual exposure has been shown to benefit various cognitive and verbal skills in neurotypical youth, including executive functioning (EF) (Baldimtii et al., 2016; Barac et al., 2014). However, few studies have systematically examined the relationship between multilingual exposure and EF in autistic children (Hambly & Fombonne, 2011). Due to concerns about language and cognitive development, providers often advise families against raising autistic children bilingually (Drysdale et al., 2015). However, recent literature has found no significant differences in cognitive or verbal skills between autistic bilinguals and monolinguals through both parent-reports and behavioral measures (Ohashi et al., 2012, Larocci et al., 2017), suggesting bilingual exposure poses no harm to language and cognitive development for autistic children.

Objectives: To investigate differences in executive functioning between autistic preschoolers with multilingual versus monolingual exposure.

Methods: A subsample of autistic children (n = 111, 80% male), ages 2 and 4 years old (M_age=41 months, SD_age=12.29), were taken from a larger study (n = 272) evaluating the development of executive functioning in autistic and non-autistic preschoolers. Participants were split into two groups based on exposure to multiple languages at home (n = 41) or only to English (n = 70). Multilingual exposure was determined by parent report that at least one language other than English was used with the child at home, and this was corroborated by later endorsement on a survey. Children completed behavioral activities (e.g., Tricky Box, Hide and Seek, A not B, and Flip Book; Goia et al., 1996) developed to measure several domains of executive functioning: Inhibition, Delay, Shifting, and Working Memory. Composite scores for each domain were computed as z-scores representing participant performance relative to non-autistic participants in the study. One-way ANOVAs were employed to investigate differences between multilingually exposed and monolingually exposed autistic children on each EF domain.

Results: We first confirmed the language exposure groups did not differ in age, nonverbal cognitive ability, or variance for the executive function battery. Next, analyses with our current sample documented that there were no significant differences between multilingually and monolingually exposed participants for inhibition (F(1, 73) = 0.02, p = .89), delay (F(1, 83) = 2.36, p = .13), shifting (F(1, 89) = 0.21, p = .65), or working memory (F(1, 65) = 1.19, p = .39).

Conclusions: Although, preliminary analyses did not show significant findings in this sample, it does reflect patterns in the literature demonstrating multilingual exposure does not negatively impact developmental skills for autistic children. While our analyses did not result in differences between the two groups, it should be noted that some tasks in our study do not yet have adequate amounts of data to draw a conclusion and data collection is ongoing. Understanding how exposure to multiple languages is associated with developmental outcomes has implications for clinicians and educators as they provide language recommendations and interventions.

429.004 (Poster) No Evidence for Reduced Susceptibility to Visual Illusions in Autism, but Synesthesia - a Twin Study


Background: The Müller-Lyer and Ebbinghaus illusions are visual illusions where nearby or constituent visual information influences size estimates of an object. Susceptibility to visual illusions has been reported to be reduced in autism spectrum condition (ASC) and
synesthesia. In synesthesia, certain sensory triggers lead automatically to additional sensory experiences – for example grapheme-color synesthesia (GCS), where numbers or letters trigger experience of certain colors. The evidence for reduced susceptibility for visual illusions has been mixed in the case of ASC and autistic traits, and limited in the case of synesthesia.

Objectives: In this ongoing study we investigate the association between susceptibility to visual illusions and autistic traits, ASC diagnosis and synesthesia, using a well-controlled twin design.

Methods: We assessed 40 twin pairs (n=80, 63 female, 48 MZ, age: 20-38, M=24.8, SD=4.7), in three groups: twins discordant for ASC or for autistic traits, (n=18, where 10 fulfilled diagnostic criteria for ASC), twins discordant for synesthesia (n=40, where 17 had GCS), and controls (n=22).

Autistic traits were measured with the Autism-Spectrum Quotient (AQ). Grapheme-color synesthesia was assessed with an objective synesthesia test.

Susceptibility to visual illusions was assessed with two tasks. In the Müller-Lyer task participants adjusted a target line to a reference line with constituent lines pointing in opposite directions (Figure 1). In the Ebbinghaus task they matched the size of circle that was surrounded by larger circles to a reference circle surrounded by smaller circles. There were 20 trials for each condition.

Accuracy was calculated by the mean difference between the size of the reference and the adjustable target. A lower value indicated higher accuracy. Values over 1.5 IQRs above the 75th percentile were excluded from analysis of that combination.

Results: We ran linear regressions both across the cohort (adjusting standard errors for twin-relationships) and within twin pairs separately for each task, with accuracy as dependent and AQ total score as independent variable (see Table 1). We found a within-pair association between AQ scores and lower accuracy in the Ebbinghaus illusion condition (b=0.0008, z=2.25, p=0.02). This association persisted when adding ASC diagnosis and synesthesia as predictors (b=0.0009, z=2.91, p=0.003). Further, GCS was associated with a more accurate score within pairs (b=-0.0251, z=-2.29, p=0.02) and across the cohort, (b=-0.0302, z=-2.94, p=0.003). We found no significant relationship between AQ scores and performance across the entire cohort or within pairs for the Müller-Lyer task, and no significant association between performance and ASC diagnosis overall.

Conclusions: We found no evidence for reduced susceptibility for visual illusions in individuals with higher autistic traits or ASC diagnosis, neither across the sample nor in the more controlled twin design. For one illusion type, there was evidence for a small increase in difficulty in estimating size in twins with higher autistic traits, compared to their co-twin. For the same illusion, individuals with GCS were less susceptible to the illusion, both across the sample and within pairs. Results need to be confirmed in a larger cohort, with more individuals with ASC.

429.005 (Poster) Priors in Facial Expressions: Difficulty Updating to Changes in Negative Facial Expressions in Autism

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Background:

Abnormalities in the use of prior information of basic perceptual stimuli have been observed in people with autism spectrum disorder (ASD), yet it remains unclear whether and how these abnormalities extend to complex stimuli and emotional stimuli in particular. Although people often change their mood and corresponding facial expressions, whether and how people, and especially people with ASD, perceive these ongoing changes in facial expressions remains unclear. The ability to adapt to changes in the emotional expressions of others is at the core of social communication skills and thus especially important for people with ASD.

Objectives: Here, we compared people with ASD and neurotypicals in their ability to acquire and then update a prior of negative facial expressions.

Methods:

Two groups of observers participated in the task, neurotypicals (n=26) and people diagnosed with autism (n=26). Observers performed a two-interval forced choice discrimination task between two facial expressions presented in succession. Facial expressions were of the same identity and ranged between angry and sad. Half the trials contained the same face (‘same’) and half were different faces that varied in morph range (‘different’). To examine the acquisition of the prior, we used the paradigm of “regression to the mean”, in which discrimination between faces is modified according to the mean statistics accumulated during the experiment. In the first segment of the experiment, participants were exposed to facial expressions sampled from a normal distribution around one average prior (sad or angry). In the second segment of the experiment, the average changed to a different prior (angry or sad accordingly).
Results: Mixed design repeated measures ANOVA was carried to examine how accuracy changed between groups and conditions. As expected, in the first segment of the experiments neurotypicals performed better at the task than ASD. Nevertheless, both groups acquired the first prior to the same extent, demonstrating the people with ASD acquire emotional priors. In contrast, in the second segment of the experiment, only the neurotypicals updated and acquired the second prior. We calculated the magnitude of the bias in each segment of the experiment and found that while for the ASD group there was a negative correlation (i.e., as the effect of the prior in the first segment was larger, the effect of the prior in the second segment was smaller), there was no correlation for the neurotypicals.

Conclusions: Our findings reveal that people with ASD are able to acquire emotional priors of facial expression yet exhibit a unique difficulty in updating this acquired prior to a new prior when the statistics of facial expression changes. These findings point to an inflexibility in processing emotional information and shed light on the social behavior of people with autism.


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Background:

- Autistic individuals may be perceived as less credible than non-autistic individuals (e.g., Lim et al., 2022). This may be because some autistic behaviours resemble behaviours commonly thought to indicate deception (e.g., gaze aversion and body movements).
- It has been hypothesised that deception judgments arise when behaviour is unexpected (expectancy violation theory). In the criminal justice system, autistic behaviours may violate expectations associated with innocence and, hence, autistic individuals may be judged as lacking credibility.

Objectives:

To investigate whether:

- Autistic individuals are perceived as less credible, and more likely guilty.
- Autistic individuals violate behavioural expectations more than non-autistic individuals
- Behavioural expectancy violations predict ratings of credibility and guilt.

Methods:

- Participants (N = 336) read a hypothetical crime scenario and were asked to give examples of verbal and non-verbal behaviours expected from persons accused of the crime. Responses revealed 11 verbal, and 11 non-verbal behaviours most mentioned as being expected in an innocent individual. These included many behaviours that may be abnormal in autistic individuals (e.g., eye contact, body movements, speech abnormalities).
- Autistic (N = 26) and non-autistic (N = 29) adults were interviewed about involvement in this hypothetical crime.
- Participants (N = 430) watched these interviews and provided ratings of credibility and likely guilt. They then provided ratings of the extent to which each individual had violated their expectations of engagement in verbal and non-verbal behaviours for an innocent individual.

Results:

- Expectancy violations were related to perceptions of credibility and guilt for nearly all verbal and non-verbal behaviours. Effect sizes ranged from small (d = .18, to large d = .61)
- Autistic individuals were perceived as less credible (d = .21)
- However, autistic individuals did not violate behavioural expectations more than the non-autistic group.

Conclusions:

- While there was no group differences in ratings of behavioural expectancy violations between autistic and non-autistic individuals, autistic characteristics did negatively impacted perceptions of credibility. Results suggest this is because these behaviours violate observers expectations.
• It remains unclear what drives differences in perceptions of credibility in this sample, where there were no group differences in expression of autistic characteristics.

429.007 (Poster) Relationships between Parenting Style, Child Language Ability, and Child Executive Control
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Background:

Social factors such as parent interaction style can significantly impact long-term brain structure and function (Huttenlocher, 2002). Specifically, prior research indicates that favorable (i.e., autonomy-supportive) and unfavorable (i.e., controlling) parent-child relationships can impact the development of executive functioning (EF) (Bernier et al., 2012). Autonomy-supportive parenting entails “the encouragement of children’s opinions, choices, decisions, and problem solving,” (Matte-Gagne & Bernier, 2011) by scaffolding or by providing age-appropriate problem solving strategies that can be employed later on when the child must work independently (Bernier, 2010). EF deficits in children diagnosed with autism spectrum disorder (ASD) have been studied extensively due to their relation to social and communication development (Ozonoff, 1991; Winsler, 2007). However, it is unknown whether parenting styles differ for autistic and neurotypical children and whether parenting strategies contribute to EF levels among young autistic children.

Objectives:

The objectives of this study were to examine whether parents of autistic children use different parenting strategies compared to parents of neurotypical children, and whether parenting strategies relate to child characteristics such as age, language ability, and EF.

Methods:

To date, parenting behavior has been coded for 16 autistic and 8 neurotypical toddlers and preschoolers aged 28-58 months (2 girls). Autistic children were diagnosed using the Autism Diagnostic Observation Schedule–Second Edition (ADOS-2) and the Autism Diagnostic Interview–Revised (ADI-R). Children and their parents engaged in an 8-minute interaction in the lab where they were asked to complete a construction task with Duplo blocks and make a puzzle together while being video-recorded. Parenting style was coded using procedures and schemes adapted from Grolnick (2002). Verbal and nonverbal parenting strategies were coded separately with eight potential scores ranging from controlling (1-4) to autonomy-supportive (5-8). EF was examined via a composite measure of behavioral control tasks that required waiting for desired objects.

Results:

Verbal parenting strategies differed by diagnostic group, t(22) = -2.88, p = .009, with parents of neurotypical children using more autonomy-supportive strategies. Nonverbal parenting strategies did not differ by diagnostic group (p = .23). Across diagnostic groups and controlling for age, verbal developmental level related to verbal parenting strategies, r(21) = .64, p = .001, but not nonverbal parenting strategies (p = .40). Finally, we examined whether parenting strategy predicted the ability to delay gratification using a linear regression. Although verbal parenting strategies predicted the ability to delay gratification (β = .47, p = .02), this relation was no longer significant (p = .42) when verbal developmental level (p = .01) was added to the full model.

Conclusions:

Our preliminary results suggest that parenting style may differ for autistic children, particularly regarding the type of verbal strategies used. For young children, parents may adapt their verbal strategies according to their child’s developmental level – using more directive strategies for children with less language. The level of verbal strategies used also corresponded with the ability to exert self-control while waiting for rewards, although child language level may account for both verbal parenting style and the development of behavioral control.

429.008 (Poster) Reported Engagement in Relation to Games Created By Autistic Youth in a Game Design Workshop

Background:

Students learn more when engaged (Boekarts, 2016). Research has shown alignment (Falkmer et al.,2012) and differences (Losh et al., 2022) between teacher- and student-reported engagement in educational opportunities. Misalignment may be particularly pronounced...
between teachers and autistic students, given that autistic people are often misinterpreted (Milton, 2012). Engagement can be a difficult but very important thing to assess in online educational contexts (Dewan et al., 2019). While researchers have studied how technology affects student engagement, no research has examined if technology products (e.g., video games) created by students may indicate engagement.

Objectives:

1. Assess whether student-reported engagement and teachers' ratings of student engagement will positively correlate with the diversity of game elements visible to the player in games produced by autistic students.
2. Assess whether student-reported engagement is more strongly associated with the diversity of game elements than teachers' reports of the students' engagement.

Methods:

20 autistic adolescents participated in a game design workshop where they were taught to create video games using a program called Flowlab. Three students did not provide links to their games to interviewers, so analyses focus on those who provided games. Games were inductively coded for front-end-type elements (the presence or absence of elements seen in Table 1). During pre- and post-assessments, students completed a survey that assessed computational thinking, self determination, and video game design self-efficacy and game-based assessments of cognitive skills (Cambridge Brain Sciences; Hampshire et al., 2012). Picture-based surveys measuring students' self-reported engagement and teachers' perceptions of student engagement were administered after specific workshop activities (see Figure 1). Individual differences and student and teacher engagement ratings were compared to summed front-end-type elements in the students' games.

Results:

Table 1 shows how often specific front-end-type elements appeared in students' games.

Summed front-end-type elements were largely unrelated to students' engagement ratings of workshop activities. However, engagement with two activities was associated with games with more front-end-type elements: a whole group activity where students created a game by taking the perspective of the player, \( r(12) = .69, p = .007 \), and that same activity delivered in small groups of 3-4 students, \( r(14) = .60, p = .014 \).

Teachers' ratings of students' engagement with the aforementioned activities did not correlate with students' engagement ratings (\( ps > .294 \)). Computational thinking, self-determination, and video game self-efficacy were also unrelated to front-end-type elements (\( ps > .270 \)).

Conclusions:

Front-end-type elements in autistic students’ games were positively correlated with students’ engagement during game design activities that encouraged students to take the perspective of the player. This suggests that engagement with activities that help students imagine players’ perspectives may encourage them to produce more engaging games. Findings align with evidence that perspective-taking activities may promote creativity (Chou & Tversky, 2020). Next, we will examine games produced by students in another workshop, and expand upon our focus on front-end types to include both front-end tokens and back-end coding used to create games in relation to student engagement. Findings thus far highlight autistic students’ creative projects as windows into their engagement with informal educational opportunities.

429.009 (Poster) Savant Abilities and Autism: A Scoping Review

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Background: The links between savantism and autism has a long history. The prevalence of savantism in autistic populations are occurring at a disproportionally higher rate compared to any other groups. Driven by media and possible other sources have perhaps led to the perception in the public that most autistic individuals have savant skills of some sort. However, studies indicate a prevalence within the autistic population somewhere around 10-30% (Rimland, 1978; Howlin et al., 2009) depending on how savantism is defined (Bölte & Poustka, 2004).

Objectives: In this review we give an insight into peer-reviewed publications on types of savant abilities, and the historical progress over the years in autism research.

Methods: We searched the database Scopus in October 2022 using no limitations in terms of language or publication period. Using a general database as Scopus gives a good insight into the overall trends of research in different areas. The following search string was used:
autism OR asd OR autistic OR Asperger OR pervasive developmental disorder OR pervasive development disorder OR pdd OR pdd-nos AND savant* OR exceptional skills OR genius OR prodigious. Publication included in this review had to have a focal point on savantism and autism, be peer-reviewed, and contain empirical data, both qualitative and quantitative. Reviews, editorials, and commentaries were also included.

Results: The search resulted in 289 references and after screening a total of 166 studies were included in the subsequent analysis. The earliest study on autism and savantism with empirical data detected in Scopus was from 1972. Most frequently the studies did not specify the type of savant ability the participants had (89 studies). The top frequent abilities specifically reported were musical-, memory-, artistic- and mathematical –abilities (see table 1 for full list of abilities). The historical trend indicates an increase of studies up until 2010 and a marked downward trend from 2011 to 2022 (Figure 1).

Conclusions: The relation between Savantism and autism is a topic of interest not just due to its mythical appeal but also as it is not yet entirely understood. In this review of the various types of abilities and trends within autism and savantism research we found some abilities are more researched than others, but the highest occurring number of studies was on savantism where ability type was not specified. Considering a massive increase in publications in general, and publications within the autism field the past couple of decades it is somewhat surprising that the trend of published research on savantism in autism indicate a decline in the past 12 years. As underlying causal factors and links between autism and savantism remain unclear we encourage researchers to continue investigate this topic area and in particular to collaborate with autistic individuals to better understand the phenomenon (Happé, 2018).

429.010 (Poster) Self-Related Processing and Mentalizing in Adolescents with Autism

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Background: The human tendency to preferentially process self-related material – i.e. the self-bias – and the ability to represent mental states – i.e. mentalizing – are essential for social functioning. Earlier research found both the self-bias and mentalizing to be altered in individuals with autism, who experience persistent social difficulties. Some studies, investigating either early- or late-stage self-processing, indicated autism-related reductions of preferential responses to self-related content. Others observed a decreased ability to attribute mental states to oneself, as well as to others (i.e. self- or other-mentalizing), in autism. However, findings regarding the self-bias and self-mentalizing, are mixed and inconclusive. To date, different aspects of self-related processing and mentalizing – potentially tapping into shared, overlapping cognitive mechanisms – have been investigated separately from one another. More research directly comparing these aspects within the same sample is thus warranted.

Objectives: Our study aims to elucidate which features of self-related processing and mentalizing differ between adolescents with and without autism.

Methods: Thirty adolescents with autism (age: $M = 14.37, SD = 1.85$; 20 males, 9 females, 1 genderfluid) and 26 age- and IQ-matched controls (age: $M = 14.73, SD = 2.05$; 13 males, 13 females) performed a visual search task (early-stage self-processing), a trait adjectives task (late-stage self-processing), a feeling-of-knowing task (self-mentalizing) and the Frith-Happé animations task (other-mentalizing). Parents also completed two questionnaires (i.e. SRS, SCQ) assessing the adolescent’s degree of autistic symptomatology.

Results: Groups did not differ on the two measures of self-bias and the magnitude of the self-bias effects was equivalent in both groups (all $t$s $\leq 0.61$, $ps \geq .542$, $ds \leq 0.16$). Also, no group difference was found for self-mentalizing ($t = 0.22, p = .828, d = 0.06$), while other-mentalizing was reduced in adolescents with autism ($t = 2.29, p = .026, d = 0.61$).

Conclusions: Taken together, our results do not provide support for altered self-processing in adolescents with autism, as neither self-bias effects nor self-mentalizing were reduced in the autism group, despite the group manifesting the expected diminution of other-mentalizing. This suggests that previous findings of altered self-processing (at least, these aspects of self-processing) in autism may not be reliable. The apparent dissociation between self- and other-processing observed in the current study presents a challenge to theories that postulate a common mechanism underpinning these abilities. Moreover, the results have relevant implications for optimizing support, which will be discussed.

429.011 (Poster) Smartphone-Based Eye Tracking for Longitudinal Studies of Autism

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Background: In-lab eye tracking studies have demonstrated atypical gaze patterns in adults with autism, but most of them are based on small samples and data from a single session. In order to develop eye tracking as a quantifiable tool for autism screening and diagnosis, we
need a better understanding of between- and within-individual variability. However, conventional eye tracking methods require specialized and often expensive equipment, placing constraints on large-scale data collection. How could gaze data be acquired from a larger population recruited from diverse communities, or over extended longitudinal sampling?

Objectives: We addressed this challenge with a new smartphone-based eye tracking method that allows participants to provide data from the comfort of their home (Valliappan et al., Nature Communications 2020). Our aims were twofold: to validate smartphone-based eye tracking by direct comparison with in-lab acquisition; and to quantify within-subject consistency of gaze patterns over time and explore psychological factors that might contribute to session-by-session variability.

Methods: Adult participants (ASD n=14; mean age = 29.8; 2 females; typically developed controls (CTL) n=20, mean age = 32.2; 3 females) watched YouTube videos and static images (from the OSIE database; Wang et al., Neuron 2015) while gaze was monitored. ASD participants had a DSM-5 diagnosis and met criteria on the ADOS; all participants had IQ in the normal range and corrected-to-normal visual acuity. Gaze data were first acquired in the lab, where participants performed the video and image free-viewing task on a smartphone (Google Pixel 3a XL) and on a monitor with a standard Tobii 600Hz desktop eye tracker. For the longitudinal component, participants performed 10 weekly smartphone sessions at home and provided weekly self-reports regarding mood, anxiety, and perceived stress level.

Results: Smartphone gaze data were acquired at 30 Hz with 0.5 to 1° of gaze error, and Tobii gaze data at 600 Hz with 0.25 to 1° of gaze error. Analyses of smartphone gaze data showed that individuals with ASD looked less at faces (Cohen’s d = 0.96) and people (Cohen’s d = 0.74) featured in the stimuli compared to CTLs, replicating the findings that are reliably reported in the literature. Gaze time proportions to social features were reliable within each individual across the two methods (smartphone in-lab Tobii; gaze time to faces: \( r_s=0.39, p<0.01 \); gaze time to people: \( r_s=0.46, p<0.01 \)) and across the weekly at-home sessions (smartphone in-lab and at-home sessions; faces: \( r_s=0.63, p<0.004 \); people: \( r_s=0.49, p<0.03 \)), both in the ASD and CTL groups, consistent with other reports (Keles et al., Molecular Autism 2022). Preliminary analysis suggested that session-by-session variability in gaze patterns in ASD is associated with self-reported stress (\( F(1,46) = 5.7, p<0.02 \)).

Conclusions: We demonstrate the power of at-home eye tracking using smartphones to collect high-quality, reliable gaze data. The approach can be used in participants with autism and can be used to collect in-depth longitudinal data, as well as data in larger samples and in underserved populations that may be difficult to test in the lab.

429.012 (Poster) Teachers’ Perceptions of Executive Functioning and Challenging Behaviors in a Sample of Students with and without Autism.

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Background: Autistic students commonly experience challenges in executive functioning (EF) (Tschida & Yerys, 2022), which can result in behaviors that are perceived to be oppositional or defiant by their teachers (Maddox et al., 2018). Teachers’ abilities to accurately identify children’s challenging behaviors from behavioral manifestations of EF challenges would allow teachers to better support their students’ EF development.

Objectives: This study aims to examine group difference in teacher-reported EF and challenging behaviors between students with and without autism.

Methods: We present preliminary results using data from a larger sample, which was collected during an ongoing longitudinal study (R324A210288). Participants include 30 students between Pre-K and 5th grade, 15 of whom have Individualized Education Programs (IEPs). The sample is comprised of 8 autistic students, 7 students with non-autistic (Other) IEPs and 15 neurotypical (NT) students. Participants in this study had a mean age of 7.39 years (SD = 1.25) and 7 females and 13 males. All participants had IQ in the normal range and corrected-to-normal visual acuity. Descriptive statistics for EF scores and challenging behaviors scores are presented in Table 1. Kruskal-Wallis H-tests were used to evaluate group differences in EF abilities and challenging behaviors, with a Bonferroni adjustment for multiple comparisons. Results revealed significant differences in EF abilities, such that students in the NT group (Mean Rank = 12.10) had significantly less impaired EF abilities than students in the Autistic group (Mean Rank = 30.39; \( p<0.001 \)) and the Other group (Mean Rank = 12.10; \( p=0.11 \)). Similarly, students in the NT group (Mean Rank = 9.73) had significantly fewer challenging behavior scores than students in the Autistic group (Mean Rank = 21.93; \( p=0.007 \)) and the Other- group (Mean Rank = 20.69; \( p=0.013 \)). No significant difference was detected between Autistic and Other groups. Finally, EF and challenging behaviors were significantly correlated in all three groups, such that strongest association was seen in the Other group (\( r=0.962; p<0.001 \)), followed by the Autistic group (\( r=0.850; p=0.008 \)) and the NT group (\( r=0.750; p<0.001 \)).
The magnitude of the association was found to be significantly different between the Other group and NT group \((z = -1.24; \ p = .042)\), with no other significant differences detected.

**Conclusions:** This study contributes to the nascent literature examining EF abilities within schools. Findings reveal that students in the Autistic group and the Other group had EF abilities that indicate mild/possibly clinical impairment, and students in the Other group exhibited levels of challenging behaviors that placed them at-risk for clinical problem behaviors. Challenging behavior was strongly and significantly correlated with EF abilities for all groups. Providing teachers training to discriminate between EF challenges and challenging behaviors would allow teachers to better support students’ EF development.

**429.013 (Poster) Temporal and Time-Frequency Signatures of Auditory Change Detection in Autism Spectrum Conditions**

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Background: In the ever-changing environment, we are constantly confronted with mixture of sounds. Change detection, the ability to detect and quickly respond to potentially relevant information, has been proved to be of significance for survival. Atypical sensory profile has been an important clinical description in individuals with autism spectrum conditions (ASC), but the neural basis underlying auditory change detection remains inconclusive.

Objectives: Our study was aimed to elucidate how autistic individuals react to two stages of auditory change detection: pre-attentive stage and attentive-dependent stage. To do this, we used a hierarchical change detection paradigm (Bekinschtein et al., 2008) to specifically evaluate the electrophysiological responses associated with two types of deviants’ detection (local and global) and how different frequency bands modulate these processes by analyzing event-related potentials (ERPs), time-frequency representations (TFRs).

Methods: A total of 21 typical developing individuals (10 females) and 20 autistic individuals (14 females) participated in this study. Continuous EEG was acquired while participants perceiving sound sequences consisting of 5 tones spaced 100 ms apart. Within each sound sequence, the first 4 tones were identical, whereas the fifth tone was either identical (local standard) or different (local deviant). On top of the within-trial level, rare sound sequences occasionally delivered to a serial of frequent sound sequences (global standard) led to a longer-term stimulus deviance (global deviant). This design enables 2 types of examinations, namely local effect (local level of change detection) and global effect (global level of change detection), which correspond respectively to the difference of neural responses between local deviant and local standard and between global deviant and global standard.

Results: We found that, compared to TD individuals, MMN response, indexing the pre-attentive process during local deviants detection, was decreased in individuals with ASC, which was accompanied by decreased power in both in the delta and theta frequency bands. In addition, the P3b amplitude, serving as a marker of attention-dependent process during global deviants detection, was reduced in individuals with ASC. This process was accompanied by significant reductions both in the delta and theta frequency range in ASC group, as well as a reduced power suppression in the beta frequency range, compared to TD group. There were no significant differences between the two groups in terms of the alpha reactivity.

Conclusions: Our results reported the profile of hierarchical auditory change detection in ASC and have the potential to enhance our understanding of brain functions in this population.

**429.014 (Poster) The Effects of Age on Temporal Reward Discounting in Autistic Children and Adolescents**

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Background: Temporal reward discounting (TRD) refers to the phenomenon in which the subjective value of a reward declines when the reward is delayed (Green & Myerson, 2004). As a consequence, the individual will more likely choose for a sooner smaller reward, instead of a later larger reward (Scheres et al., 2007). The majority of TRD studies in children indicates no significant differences between autistic children and neurotypical children (e.g., Karalunas et al., 2018), whereas some studies find a steeper TRD-slope in autistic adolescents and adults (e.g., Carlisi et al., 2017; Warnell et al., 2019).

Objectives:

This study investigated the steepness of the TRD-slope and the development with age in autistic children and adolescents, compared to neurotypical children and children with attention deficit hyperactivity disorder (ADHD).
Methods:

Participants were 298 children and adolescents aged between 8 and 16 years with autism (N = 73), ADHD (N = 84) and neurotypical development (N = 141). In 2 computer tasks they had to make a choice between an immediate reward and a delayed reward with a higher value. The reward was money (task 1) or an alternative reward (material, food, a social reward or an activity; task 2).

Results:

Linear regression with age, group, and their interaction as predictors for the TRD-slope of monetary rewards revealed significant main effects of age (F(1,284) = 6.18, p = .013) and group (F(2,284) = 3.44, p = .034). More specifically, a less steep TRD-slope was found with increasing age. Autistic and neurotypical children showed a significantly less steep TRD-slope than children with ADHD. No significant difference was found between autistic and neurotypical children. The interaction of age and group was marginally significant (F(2,284) = 2.70, p = .069). Only within the group of autistic participants no significant age effect was found. A second linear regression was conducted for the TRD-slope of alternative rewards with the same predictors, inclusive reward type. A main effect of reward type was found (F(3,210) = 3.81, p = .011), with a less steep TRD-slope for materials compared to other rewards. Also, a main effect of age (F(1,210) = 7.87, p = .005) and group (F(2,210) = 3.57, p = .03) was found, and the interaction term was marginally significant (F(2,210) = 3.00, p = .05). Just like in the first task, TRD-slopes were less steep with increasing age, but only in the neurotypical group. No significant effects of age were found in the autistic children and children with ADHD. However, with increasing age, group differences emerged between autistic and neurotypical children.

Conclusions:

Like most studies, no differences in TRD were found between autistic and neurotypical children, while children with ADHD showed a steeper TRD-slope. Also, no age effects were found within the group of autistic children, whereas the steepness of the TRD-slope in neurotypical children and children with ADHD mostly decreases with age. This might be in line with research in autistic adolescents and adults, where steeper TRD-slopes were found, and may indicate an increasing appreciation of rewards with age.

429.015 (Poster) The Experience of Superior Perceptual Capacity in Neurodivergent Adults


Background:

Studies have found strong evidence for superior perceptual capacity - the ability to process more information at any one time - in autistic people without intellectual disability. It is crucial to investigate the experiences of participants directly by building on these simplified, lab-based experiments. In addition, to evaluate superior perceptual capacity as a marker of autism, it is paramount to understand whether it pertains specifically to autism, or is a general consequence of neurodivergence. Currently, most autism research is carried out in comparison with the majority population, yet this cannot assess the uniqueness of a particular trait. This study compared experiences with those who have Attention Deficit Hyperactivity Disorder (ADHD). Here we move beyond normalcy and take a qualitative cross-syndrome approach to understand whether superior capacity is a specific component that underpins autism.

Objectives:

We aimed to gather rich qualitative data to (1) understand the experiences of perceptual capacity in autistic people, people with ADHD, and the majority, and (2) compare experiences across diagnostic labels.

Methods:

This project upholds participatory ideals and an open research approach. A long-form online text survey asking about perceptual experiences was co-designed by an autistic researcher from the team, working with a neurodivergent majority consultancy group. 362 adults were recruited from UK advocacy groups. Respondents were adults diagnosed or identified as autistic (n=100), ADHD (n=35), autistic with ADHD (n=110) or majority (n=117). Alongside the survey, participants completed the brief autism and ADHD scales to provide additional dimensional information respectively. Pre-registration and codebooks were published on the Open Science Framework for replication.
Thematic analysis was an apropos methodology for a 113,260 word dataset of novel text. The two coding researchers approached the text without knowledge of participants' diversity; only once themes had been developed were groupings revealed and further conceptualisation made. In their negotiation of salient themes the researchers brought their own experiences of neurodiversity, autism and ADHD.

Results:

Themes clustered around concepts of control and strategy, focus and distraction, and the perceptual reality of an ideal place. Control was discussed as more than simple avoidance of the personal cost of distraction, it was an inherent strand of being able to advocate for strategies that could either fill excess sensory capacity or modulate the sensory world. A “fine balance” was sought by participants to “smooth” and control the sensory world in which distraction and focus were experienced. This was evident in real world narratives of annoyance and frustration and in the soothing escape of being “happy and in flow” through thinking with a robust “association network”. Facets of ideal spaces to flourish were remarkably similar across all participants.

Conclusions:

These findings tentatively posit a restructuring of practice that ceeds control over environments through a host of potential tools and strategies that would be to the benefit of all. Furthermore, it suggests that the superior sensory capacity is a wider underlying symptomatic construct that suggests further linkages between autism and ADHD.

429.016 (Poster) The Link between Alexithymia, Sustained Attention, and Emotion Regulation in Children with Autism
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Background: It is known that attention can be used to regulate emotions (Derryberry & Rothbart, 1988). Furthermore, it has been shown that children with autism who have difficulties in emotional awareness (i.e. alexithymia) tend to focus more on negative or irrelevant information (Embrechts & van Nieuwenhuijzen, 2009). Thus, leading to the assumption that alexithymia may impair attentional deployment (Rieffe et al., 2011), which can lead to poorer emotion regulation. However, little research exists on the link between attentional capacity, alexithymia, and emotion regulation in autistic children.

Objectives: To analyse the link between alexithymia and the attention capacity of children with autism and their role in emotion regulation ability.

Methods: Thirty-seven autistic children (5 female) and 41 typically developing (TD) children (9 female) aged 3-13 years old participated in the study. Parents reported on their children’s alexithymia using an adapted version of the Alexithymia Questionnaire for Children (Rieffe et al., 2006). Children first took part in a sustained attention task in which they watched a 3-minute slide presentation of 15 pictures. Then, children were exposed to the “toy behind a barrier” frustration-eliciting situation. In the sustained attention task, the total amount of time looking at the presentation was coded (duration: maximum = 180 seconds) as well as the intensity of facial interest (interest: 0=not interested, 1=interested, 2=very interested). In the frustration-eliciting situation, children’s behaviors were coded into 12 categories and then grouped into three emotion regulation strategies: disruptive, passive, and active self-regulation.

Results: Regarding emotion regulation, autistic children displayed more disruptive \( F(1,76)=25.24, p<.001, n_2p=.25 \) and less passive strategies \( F(1,76)=11.35, p<.01, n_2p=.13 \), but similar levels of active self-regulation \( F(1,76)=2.03, p=.16, n_2p=.03 \) than TD children. Autistic children were reported by their parents as having significantly more alexithymia than TD children \( t(76)=4.98, p<.001 \) and showed poorer focused attention than TD children: their sustained attention was shorter \( t(43)=5.492, p<.001, d=1.33 \) and their interest lower \( t(70)=4.118, p<.001, d=0.96 \). Correlation analyses revealed that both indicators of attention were negatively correlated to the use of disruptive \( r=-.56, p<.001 \; \text{interest}: r=-.28, p<.05 \) and positively correlated to passive strategies \( r=.57, p<.001 \; \text{interest}: r=-.33, p<.01 \). However, no significant correlation was found between attention and active self-regulation, nor between attention and alexithymia. Further regression analyses were conducted to predict the use of the three emotion regulation strategies using a enter method (see Table 1). They revealed that the duration of sustained attention could predict the use of disruptive and passive strategies above and beyond autism diagnosis. However, alexithymia did not contribute to it. Further analyses exploring possible moderation roles of alexithymia also revealed no significant results.

Conclusions: Our results show a significant association between children’s capacity for sustained attention and their use of less disruptive and more passive emotion regulation strategies. However, contrary to what expected, alexithymia was not linked to attention and did not contribute to explain emotion regulation. The present results can offer new perspectives on how attention difficulties could contribute to better understand emotion dysregulation in children with autism.

429.017 (Poster) The SIB Study – Exploring the Links between Executive Function and Self-Injurious Behaviour in Autistic Children with a Co-Occurring Intellectual Disability
Background: Self-injurious behaviours (SIB), such as headbanging and skin picking are common in children with autism and a co-occurring intellectual disability. Previous research identifies an association between the presence of SIB and caregiver-reported impulsivity and overactivity in autistic samples (Richman at al., 2012) with higher levels of impulsivity reliably predicting the presence of SIB over both three years (Richards et al., 2012) and 10 years (Laverty et al., 2020). These findings suggest there may be stable and reliable behavioral mechanisms that play a key causal role in SIB; though until now have not been explored through direct methods. Traditional approaches of understanding SIB often assume an operant learning framework, whereby behaviors are maintained through an interaction between an individual and their environmental reinforcers (Emerson et al., 2012). Though this position is helpful, it neglects a key question; what are the underlying mechanisms beyond the learning account that may lead to the development of SIB? There may be underlying cognitive difference that at present remain unexplored in children who have autism and a co-occurring intellectual disability due to a paucity of developmentally appropriate robust assessments.

Objectives: The SIB study aimed to investigate the putative relationship between both direct and informant-based measures of executive function (EF) abilities and the presence and severity of SIB in autistic children with co-occurring ID.

Methods: A novel and developmentally appropriate EF battery was developed as part of a battery of assessments administered remotely to a sample of 159 children with autism and a co-occurring intellectual disability (mean age =10.40 [range= 4.02–15.49], 37 female, vineland adaptive age equivalent mean=2.85 [range = 1.26–11.3]). The SIB study was conducted completely remotely, with parents and caregivers delivering a battery of EF tasks in their own home to their child guided in real time through Bluetooth headphones.

Results: Preliminary analysis of the first 60 participants indicated SIB was moderately associated with a direct measure of updating and inhibition (r=-.28, p <.05), caregiver-rated impulsivity (r=.41, p =.001) and overactivity (r=.33, p <.05). Impulsivity and overactivity were significant unique predictors of SIB (p <.05), over and above general cognitive ability. In an age-and-ability matched subset, children who displayed SIB were rated as significantly more impulsive on average than those who did not (g=.78). On direct measures of EF, there was a significant small to moderate association between efficiency scores and SIB, and a small to moderate relationship between perseveration and SIB which also approached significance.

Conclusions: Preliminary findings from the SIB study replicate previous findings of a robust relationship between caregiver-rated impulsivity and SIB. The direction and magnitude of effects between direct measures of EF and SIB offer tentative support for a role of behavioral inhibition in the developmental course of SIB. These findings extend our current understanding of SIB, the operant model and inform proactive intervention strategies. Additionally, novel methodology’s highlight the feasibility of remote EF assessment in children with autism and a co-occurring intellectual disability, and under-represented group within the current evidence base of SIB and EF.

429.018 (Poster) Thermal Imaging for Internal State Detection
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Background:
As humans we struggle in identifying social queues, let alone complicated compound emotions like frustration, enjoyment and boredom (Internal states). Similarly, children with ASD would face a multiplied version of this issue when having normal interactions everyday in particular as they do have a harder time identifying these emotions (Bal E. et.al, 2010).

Understanding these emotions would allow us to have more harmonious interactions and more empathy towards the participants of the interaction. Therefore, multiple studies have been done to automatically detect those internal states using physiological signals like heart rate or EEGs. These signals however would need intrusive sensors that would feel uncomfortable for kids, in particular the kids that are sensitive to touch.

Therefore, other studies have used facial expressions and gaze to detect the internal states of children with ASD. But, children with ASD tend to show less facial expressions for limited duration, which makes the use of facial expression detection during an interaction in real-time challenging and inaccurate (Trevisan, D. A et.al, 2018).

With the recent wide use of thermal cameras, a study focus was established in this area, as multiple works have been recently published to detect emotions using thermal imaging in healthy adults (Mohamed Y. et.al, 2022) and detecting autism in children (Ganesh K. 2021).

Objectives:
In this work we propose to use thermal imaging combined with machine learning approach to detect internal emotional states in real-time and mitigate them using robots during gamified therapy sessions for personalization.

This process is composed of two parts: data collection and validation on healthy adults and testing on people with ASD.

Methods:

We collected both Thermal regions and facial expressions of 29 participants during 20 minutes of using a gamified robotic platform using palmsized tangible robots. The participants then play 10 rounds of the tangible PacMan inspired game while physically manipulating the robot and avoiding the autonomous ghost robot (Guneysu Ozgur et.al, 2018). The data collection composed of three conditions induced through game difficulty design: baseline, enjoyment, frustration and boredom. Each condition has different game configuration to provoke the emotion.

After each set of 10 rounds the participants would answer self reports of how frustrated, enjoying or bored they were.

Results:

After running an ANOVA, the self reported emotional states correlated to the emotion provoked (P < 0.001). Similarly, using the thermal data the averages of the thermal regions collected also was significantly different during each condition. Furthermore, A machine learning algorithm (LSTM) was developed and was able to detect each condition from thermal features with accuracy of 77% using both thermal and action units, compared to the use of just action units which has the accuracy of 69%.

Conclusions:

The use of thermal data can significantly improve emotion detection during gamified robot-mediated exercises, which is the first step to mitigating negative emotions through game difficulty adaptation. Evidently, the use of thermal data for healthy adults did increase the detection accuracy and it is hypothesised that this increase would be more evident on people with ASD.

429.019 (Poster) Trajectories of Attention Problems in Children with ASD


Background:

Attention-deficit/hyperactivity disorder (ADHD) frequently co-occurs with autism spectrum disorder (ASD). Cross-sectional studies show that children with co-occurring ASD and ADHD have poorer social skills than children with either condition alone. Two previous longitudinal studies found multiple trajectories of attention problems (AP) in autistic individuals followed from 2 to 6 years (Visser et al., 2017) and from 9 to 26 years (McCauley et al., 2020). In the latter study, high and decreasing AP (41% of sample) were associated with fewer positive adult outcomes (including social outcomes) compared to the low and decreasing AP trajectory (59%).

Objectives:

Describe trajectories of AP in autistic children from age 2–4 years to age 10.5–11 years and examine the association of trajectories with social skills outcome. We hypothesized that (1) we would find at least two trajectory groups, one with low AP over time and another with elevated AP; (2) higher autism symptom severity, lower child IQ, and higher socio-economic risk (SER) at baseline would be associated with higher or increasing AP; and (3) children with elevated AP (initial or later) would have lower social skills than children with less severe AP.

Methods:

Data from 394 children, assessed across eight time points from baseline (T1; $M_{age}= 3.35$ years, $SD= 0.78$; 84% boys; $M_{FSIQ}= 51.22$, $SD= 28.71$) to age 10.5–11 years (T8; $M_{age}= 10.75$ years, $SD= 0.23$), were drawn from the pan-Canadian Pathways in ASD cohort study. Trajectory groups based on Child Behavior Checklist (CBCL) Attention Problems (AP) scores were derived through group-based trajectory
modeling. Baseline covariates included autism symptom severity (Autism Diagnostic Observation Schedule calibrated severity score; ADOS CSS), child full-scale IQ (FSIQ; Merrill-Palmer-Revised Scales of Development or Wechsler Preschool and Primary Scale of Intelligence-III), and SER represented as an ordinal variable incorporating lone parent status, caregiver education and immigration status, and annual household income. The Vineland Adaptive Behavior Scale, Second Edition, Socialization standard score at T8 indexed social skills.

Results:

A five-group model with linear slopes had optimal fit and adequacy (Figure). Compared to children in the Low Stable group, the Moderate Increasing group had higher baseline ADOS CSS ($t = 3.04; p = .002$); the High Stable group had higher baseline SER ($t = 2.99; p = .003$). The High Stable group had significantly lower socialization scores at T8 than any other group and the Moderate Decreasing group had higher socialization scores than the Moderate Increasing group (Table)—group differences remained significant when controlling for ADOS CSS, FSIQ, and SER.

Conclusions:

Our findings support various AP trajectories from preschool years to age 10.5–11 in autistic children. This contrasts with fewer, decreasing trajectories identified at older ages (McCauley et al., 2020). Approximately 50% of children in the current cohort had either persistently high or moderate and increasing AP, a similar pattern as found by Visser et al. (2017). More severe baseline autism symptoms and higher SER were associated with high or increasing AP trajectories, which were in turn associated with poorer social skills outcome, supporting a negative effect of ADHD symptoms on social skills of children with ASD.

429.020 (Poster) Transition in Regular and Special Education in Autistic Children: A Longitudinal Study on Predictors and Policy Effects.

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**Background:**

Since 2014, inclusive education policy (IE policy) allows children with additional support needs, including children with autism, to attend regular education in the Netherlands. It is unclear whether this was effective or for which autistic children this policy impacted on school placement and rate school transitions. Individual child characteristic seems to be related to school placement and transitions of autistic children (Lord et al., 2022). The current study explored the impact of inclusive education on autistic children’s school placement and school transitions over time.

**Objectives:**

We explored the impact of the IE policy on autistic children’s school placement and transition by examining 1) the proportion of autistic children attending education in a special school changed over time; and 2) school transitions since in the introduction of the inclusive education policy; and 3) how individual child characteristics are related to their placement and transitions.

**Methods:**

The current study is a longitudinal cohort study using data collected through the Netherlands Autism Register (NAR). 1523 Adult parents or legal guardians of autistic children completed online surveys from 2013 to 2021. They provided information on demographics, their child’s autistic traits, strengths and difficulties in behavioral indicators, (e.g. emotional, behavioral, peer relation problems, inattention/hyperactivity) and type of education. Hierarchical logistic regression analyses were performed.

**Results:**

The likelihood of placement in a special school was higher for children with male gender, lower intelligence and co-occurring conditions. Surprisingly, year and inclusive policy did not predict school placement. The likelihood of placement in a special school increased with a higher score on strengths and difficulties in behavioral indicators. Both behavioral problems and peer relation problems were associated with placement in special schools ($p <.05$). The likelihood of a school transition from a regular school to a special school was higher for younger children with lower intelligence levels and for the first years since the introduction of the policy. For the transition from special to regular education, the findings on the child characteristics intelligence and age were the mirror image: transitions were more likely for older children with higher intelligence levels. Year was not a significant predictor for a transition from a special to regular school.
Conclusions:

To our surprise, the inclusive policy had no impact on the proportion of autistic children in regular and special schools. Individual child characteristics were associated with school placement, especially the behavioral indicators behavioral problems and peer relation problems. Especially, behavioral indicators that are perceived as disturbing by the environment seemed to be related to placement in special education. The inclusive policy had no impact on the school transitions of children with autism. Only in the first years after the introduction, there were more transitions to regular schools, but school transitions were limited. As expected, intelligence and age were associated with transition between types of education.


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Background: Self-restraint refers to purposeful restriction of own body parts and occurs alongside seemingly ‘involuntary’ self-injurious behaviour (Dizmang & Cheatham, 1970). A recent meta-analysis revealed 39% of individuals with autism, intellectual disability and/or rare genetic syndromes self-restrain, most commonly by ‘holding or squeezing objects’ or ‘holding onto others or others’ clothing’ (both 32%; Marlow et al., 2022). Self-restraint is understood through paradigms of negative reinforcement through the escape of self-injury (Luiselli, 1993), however this theoretical approach challenges prevailing models of operant learning: the presence of self-initiated restraint suggests self-injury may not be a purely learned behaviour that is constrained by environmental or sensory contingencies. Models of impaired inhibitory control suggest that for a subgroup of individuals self-restraint may emerge as an attempt to regain control over uncontrollable, function-less, non-adaptive SIB. Supporting evidence from Richards and colleagues (2017) identified the presence of SIB and impulsivity predicted the presence of self-restraint two-fold in a sample of autistic individuals. However, despite empirical support self-restraint remains an under-researched and poorly understood behaviour.

Objectives: This study explored the putative role of impulsivity in the paradoxical association between self-restraint and self-injurious behaviour.

Methods: Caregivers of 159 children with autism and a co-occurring intellectual disability (mean age = 10.40 [range = 4.02 – 15.49], 37 female, Vineland Adaptive Behavior age equivalent mean = 2.85 [range = 1.26 – 11.3]) completed a battery of questionnaires exploring self-restraint, self-injurious behaviour and executive function. Child adaptive functioning was assessed using The Vineland Adaptive Behavior Scale – Third Edition (Sparrow et al., 2016). A novel battery of play-based assessments measuring impulsivity and other executive functions were administered remotely via video conferencing software.

Results: The prevalence of self-restraint in the first 152 participants within this sample was 95% (n = 145). 111 participants (73%) showed both self-restraint and self-injury, while 35 children (23%) self-restrained in the absence of self-injury. Five individuals (3%) self-injured without self-restraint, while one participant did not self-injure nor self-restrain. The most prevalent self-restraint behaviours were ‘wraps a blanket, sheet or other material around self’ (70%), ‘asks for others to hold their arms’ (64%) or ‘hands’ (59%). The least prevalent behaviours were ‘holds hands together behind their neck’ (14%), ‘wraps their hands/arms together with pieces of long material’ (14%) and ‘wraps a long piece of material either of both arms’ (8%). Self-restraint scores and SIB severity scores were statistically significantly associated, r = .17, p < 0.05. Preliminary analysis of the first 60 children to complete the remote play-based assessments revealed a small association between self-restraint and inhibition, r = -.18.

Conclusions: Preliminary findings revealed most of the sample of autistic children with intellectual disability showed some form of self-restraint. According to caregiver report, most individuals showed both self-restraint and self-injurious behaviour, with analyses replicating previous findings of a statistically significant association. A small negative correlation was identified between self-restraint and a play-based direct assessment of inhibition, indicating that impairments in behavioural inhibition might underpin the presence of self-restraint.

429.022  (Poster) Understanding the Relationship between the Interdependence of Attentional Networks and the Locus Coeruleus – Norepinephrine (LC-NE) System and ASD and ADHD Traits: A Pupilometry and ERP Study

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Background:

Attention has been divided into alerting, orienting, and cognitive control. The alerting network is responsible for maintaining a state of increased sensitivity to incoming stimuli, whereas cognitive control is critical for filtering irrelevant information. Previous research has highlighted the interdependence between these two networks, with individuals with ASD showing atypically increased alerting-cognitive
control interactions. However, the neural mechanism(s) associated with attentional network interdependence in ASD remains unknown. Prior finding has shown that individuals with ASD demonstrate atypical the locus coeruleus – norepinephrine (LC-NE) system, the neuromodulator associated with the alerting network. Yet, it is unclear whether differences in LC-NE activity contribute to greater attention network interactions.

Objectives: Current study examined 1) whether the higher network interdependence is associated with ASD and ADHD traits, and 2) the association between tonic and phasic LC-NE activity and alerting-cognitive control interdependence and ASD traits in cohort of neurotypical individuals with high- and low-autism traits.

Methods: Participants included 80 college students with the highest (n=40) and lowest (n=40) quartiles of Autism Quotient. The study included two experiments: 1) a cued-flanker paradigm to measure alerting (RT, cue-induced pupil-dilation response [cue-PDR]) and cognitive control (RT, N2, P3 ERP amplitude, target-induced PDR [target-PDR]), and 2) a resting task to measure pupil diameter as a measure of tonic LC activity. For cued-flanker paradigm, isoluminant stimuli (cue, arrows) were presented on a gray background. Participants were instructed respond to the direction of center arrow. For resting task, participants were asked to look at a black central crosshair, which was displayed on a gray background. Pupil diameter was monitored using an EyeLink 1000 Plus remote eye-tracking system and EEG was recorded using 128-channel high-density Geodesic electrode array. ASD and ADHD traits were measured using the Broad Autism Phenotype Questionnaire (BAPQ) and Conners ADHD Adult Rating Scales (CAARS).

Results: For cued flanker, network interactions were present for both RT and N2 amplitude (p<.05), which supports the interdependence of alerting and cognitive control attention in both behavioral and electrophysiological measures. The interaction was not significant for target-PDR or P3 amplitude.

The RT alerting-cognitive control interaction score was positively related to BAPQ and CAARS scores (p<.05), which indicates the greater interdependence is linked to increased ASD and ADHD traits.

Contrary to our hypotheses, both tonic (resting pupil diameter) and phasic (cue-PDR) LC measures were not related to RT alerting-cognitive control interaction scores. However, increased tonic (larger resting pupil size) and decreased phasic (cue-PDR) activities were associated with increased BAQ (p<0.05), which suggests atypical LC-NE activity is associated with increased ASD symptoms.

Conclusions: As hypothesized, our findings show that a greater interdependence between alerting and cognitive control attentional networks was related to higher ASD and ADHD traits. Consistent to prior results, increased ASD traits were associated with elevated tonic and decreased phasic activation of the LC-NE system. However, interindividual differences in tonic and phasic activity were not associated with variations in attention network interdependence. These findings expand our understanding interplay between attentional processes and suggests that they may be linked to ASD and ADHD symptoms.

429.023 (Poster) Use of Contextual Information Varies with ASD and ADHD Traits: Transdiagnostic Insights from a Novel Computational Model and Task Paradigm.

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Background:

Rigid patterns of behavior exhibited in autism spectrum disorders often manifests as difficulty in generalizing and adapting previous knowledge to a novel context (Plaisted 2001). Heterogeneity along the autism spectrum suggests there are multiple potential drivers of behavioral rigidity. Furthermore, these drivers may also relate to ASD’s high comorbidity with attention-deficit hyperactivity disorder (ADHD) (Antshel et al. 2016). However, we lack a rigorous understanding of cognitive generalization in autism, how that manifests heterogeneously across the spectrum and how it relates to transdiagnostic overlap with conditions such as ADHD. In part this gap arises from our incomplete understanding of how humans in general (both with and without ASD / ADHD) categorize and generalize stimuli and situations.

Objectives:

To investigate heterogeneous learning, attention and generalization behaviors in subjects with ASD-related traits, particularly in the context of a new computational model of human categorization processes (Pettine et al. 2021). Initial data is in the general population. Additional data is being collected with members of the adult ASD community.

Methods:
We paired commonly used trait questionnaires with newly-developed reinforcement learning tasks to investigate the use of attention during latent-state learning (Pettine et al. 2021). These tasks investigate how context information drives learning and generalization, based on a new computational model of the cognitive processes driving subject behavior (see Figure 1). Subjects (N=104) were recruited through an online research platform (Prolific) to perform online tasks. We used the trait questionnaires to categorize subjects according to the presence or absence of ADHD and ASD traits (See Figure 1), and analyzed the continuum of scores along trait questionnaire subscales. We then examined the generalization patterns in the new tasks using confusion matrices, the overall proportion of errors during generalization, and whether subjects used holistic internal state representations versus discriminative features for categorization. Parameters in the model enabled us to characterize how context information shaped error patterns during generalization (see Figure 2).

Results:

Increasing hyperactivity-impulsivity scores were associated with increased overall task performance, while increases in the inattentiveness score were unrelated to overall performance (Figure 2B). Using trait thresholds, we found a load effect for ASD and ADHD (Figure 2A, C). Each clinical trait was independently associated with a specific form of attention that over-learned the discriminative rule. Those high in both ASD and ADHD traits showed an additional effect where they attended differently to the features of states learned in initial contexts, based on the sequence of learning. Both phenomena can be described by alterations in context learning in the model (Figure 2D).

Conclusions:

These results provide insight into the heterogeneous manifestation of altered learning, attention, and generalization in subjects with ASD traits. We are currently collecting and comparing the data with autistic adults and will present additional findings.

429.024 (Poster) Use of the Weekly Calendar Planning Activity to Assess Executive Functioning in Autistic Adolescents

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Background: Youth with autism spectrum disorders (ASD) are known to have challenges with executive functioning in the areas of organization, prioritization, time management, and planning as rated by caregivers and teacher. However, there are few ecologically valid measures to objectively assess their skills in these domains. The Weekly Calendar Planning Activity (WCPA) is a complex, cognitively demanding performance-based measure that involves entering 18 appointments into a weekly schedule while adhering to rules and avoiding conflicts. Successful completion requires planning, flexibility, inhibition, and prospective memory. Thus, the WCPA holds promise as an objective measure of executive functioning deficits in autistic youth; however, to date, no studies have examined the performance of adolescents with ASD on the WCPA.

Objectives: To characterize the performance of autistic adolescents on the WCPA, and to explore whether WCPA accuracy is associated with behavior ratings of executive functioning.

Methods: Participants included 36 autistic youth (ages 11 to 14 years, M=12, SD=96; 88.9% male; 75% White) without an intellectual disability (IQ>80; M=104.5, SD=14.9). ASD status was confirmed via the ADOS-2 (n=34) or score ≥15 on the Social Communication Questionnaire (n=2). Participants completed the WCPA and caregivers completed the Behavior Rating Inventory of Executive Function, Second Edition (BRIEF-2). The WCPA involves scheduling a list of appointments into a weekly calendar while following rules, avoiding conflicts, monitoring time, and inhibiting distractions. Descriptive statistics were used to characterize WCPA performance, and correlations between WCPA appointment accuracy and BRIEF-2 subscales were computed.

Results: Teens with ASD performed poorly on the WCPA. Many struggled to even enter a single appointment, and of those who entered an appointment, their accuracy was <5 out of 18 on average (Table 1). In fact, the majority of teens performed at the <5th percentile for number of appointments entered, accuracy, and strategy use, and at ≤10th percentile for rule following. Notably teens lacked insight into their poor performance; i.e., difference between actual appointments entered accurately and what the teen thought that they entered accurately was 5.34 (SD=5.7). In terms of errors, the majority had ≥3 missing appointment errors (Table 2). Many teens (n=18) made >2 location errors. Few made repetition, incomplete, self-recognition, or time errors. The majority of the sample followed 3 or more of the 5 rules (n=29) and used 2 or more strategies (n=22). Number of accurate appointments was not significantly associated with any caregiver-reported BRIEF-2 subscales (all p’s <.14).

Conclusions: Overall the WCPA was quite cognitively demanding for youth with ASD, with many failing to successfully schedule any appointments. Most autistic teens made errors including difficulty placing appointments or neglecting to put an appointment on the calendar. These results have implications for utilizing evidence-based strategies to teach autistic teens how to manage their own time and plan and prioritize homework assignments, extracurricular activities, etc. Further, it appears that the WCPA may be measuring aspects of executive functioning not captured by the BRIEF-2 caregiver-report, which suggests it may be a complementary, real world assessment of
Background: Individuals on the autism spectrum sometimes exhibit difficulties with understanding narratives. Narrative comprehension requires, among other cognitive processes, the generation of inferences to understand story elements that are not explicitly stated. Although difficulties with inferencing are documented among autistic individuals when using linguistic stimuli, it remains unclear whether similar difficulties would occur for non-linguistic stories. Here, we investigated this issue in adults using visual narratives, (i.e., comic strips) without dialogue or captions.

Objectives: To use visual narrative sequences to test inference-making abilities in individuals across the autism spectrum.

Methods: Autistic and non-autistic individuals participated in two studies of inference generation. In the Deletion Recognition Paradigm (DRP), we measured participants’ (N=101) accuracy at identifying where a panel had been removed from a comic strip. In the Self-Paced Viewing Paradigm (SVP), we measured participants’ (N=48) reaction times (RTs) to view each panel in 6-panel comic sequences that were intact (“normal” condition), 5-panel sequences where the “Peak” panel (i.e., that reflecting the height of the action) was missing (“inference” condition), and 6-panel sequences where the Peak was replaced by an incongruous panel (“violation” condition). Participants also answered comprehension questions after 40% of trials. For both experiments, participants completed the Autism Quotient (AQ) questionnaire, to determine levels of autistic traits, and the Visual Language Fluency Index (VLFI) to assess experience with visual narratives. We used linear regressions to examine the relationship between AQ and VLFI scores on accuracy and RTs in each task.

Results: For the DRP, increasing visual language fluency (i.e., experience with visual narratives) was associated with higher accuracy at identifying when an early panel in a sequence had been removed, but only for individuals with lower levels of autistic traits (“low AQ” group); for those with higher levels of autistic traits (“high AQ” group), visual language fluency did not modulate accuracy. For the SVP, VLFI scores were positively associated with accuracy on comprehension questions in the violation condition for the low AQ group, but negatively associated in the high AQ group. Across both tasks, scores on the Imagination subscale of the AQ, which measures participants’ inclinations for fantasy pretending and character perspective-taking, were negatively associated with inference-making abilities (accuracy in identifying a missing panel in the DRP; comprehension question accuracy in the SVP); as scores were increasing on the subscale (i.e., imaginative thinking abilities were decreasing) reduced levels of accuracy were found.

Conclusions: For individuals across the autism spectrum, the relationship between visual narrative experience and inferencing abilities was dependent on the level of autistic traits: higher VLFI scores were associated with better accuracy on both tasks, but only for those with lower AQ scores. Across both experiments, the ability to use imaginative thinking was specifically associated with inferencing abilities, such that participants reporting more difficulties with imagination showed lower accuracy on our inferencing tasks. These studies confirm that inferencing may also be different in visual narratives for autistic individuals, and reveal important individual differences to consider when examining inferencing abilities in adults across the spectrum.

Background: Superior visual search (i.e., an odd stimulus is to be found among others) has been reported quite consistently in autism, which might be an expression of enhanced attention to detail in this group. Superior disembedding (i.e., finding a target embedded in a complex background) has been reported less consistently. Synesthesia, a sensory phenomenon where individuals perceive additional sensations in response to certain trigger stimuli, is also associated with superior performance in visual tasks requiring detail focus, while only a handful of studies exist.

Objectives: Here we assessed visual search and a task mimicking real-life disembedding, using invariants built on the same target but with variations in size and rotation. Associations with attention to detail traits, autism diagnosis, synesthesia and familial influences were explored using a twin design.

Methods: The sample consisted of adult twins (total n=58), distributed among the following groups: a) twin pairs where one or both twins fulfilled DSM-5 criteria for autism (n=16, 10 with autism diagnoses), b) twin pairs where one was identified to have grapheme-color synesthesia with an objective test (n=28, 14 pairs discordant for grapheme-color synesthesia) and c) neurotypical twin pairs (n=14).
Participants completed computerized tasks identifying invariants in visual search and disembedding. In each task, an image with 12 targets was presented for a maximum of 30 seconds, and the participants were instructed to identify targets by mouse-clicks as fast as possible. Accuracy was defined as total number of identified targets per image. Autistic traits were assessed using the Attention to Detail subscale of the Autism Quotient (12 items).

We used one-way ANOVA to compare the three groups of twin pairs and linear regression analyses to assess task performance as a function of attention to detail traits, autism diagnosis and grapheme-color synesthesia, both across the entire sample and within twin pairs.

Results: The three twin groups (a-c) differed in visual search (F(55)=5.9, p<.005) but not in disembedding performance (p=.81). Post-hoc t-tests revealed that twin pairs where one or both had autism found on average 1.5 fewer targets compared to the two other groups (p-values<.005). Across the entire sample, attention to detail traits were associated with better visual search (b=.17, SE=.05, p<.001), but not disembedding performance, and having an autism diagnosis was associated with lower visual search performance (b=1.50, SE=.41, p<.0005). The positive association between attention to detail and visual search was significant also within twin pairs, where familial factors are implicitly controlled for (b=.39, SE=.16, p<.05). No significant associations were observed for synesthesia, neither across the sample nor within pairs.

Conclusions: In line with our expectations, higher attention to detail traits appear to be an advantage in visual search. However, in contrast to our expectation, autistic individuals found fewer targets in the visual search task, and neither autism or autistic traits, nor synesthesia were associated with superior disembedding of targets with varying sizes and rotations.

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Background: Working memory (WM), an important component of executive functioning, involves maintaining and updating incoming information, then revising them by replacing old information with newer, more relevant information. Working memory is associated with positive classroom engagement, academic readiness, early mathematical and literacy skills, language acquisition, and Theory of Mind. While WM is an area of difficulty for many autistic children, it is highly malleable throughout childhood with various student-level and environmental factors playing important roles in their development.

Objectives: The current study aims to identify student- and environmental-level factors that are associated with autistic children’s working memory performance upon school entry, and factors that contribute to their longitudinal growth throughout their elementary school years.

Methods: This study used the Early Childhood Longitudinal Studies-Kindergarten Class of 2011 (ECLS-K: 2011). A piecewise conditional latent growth models were constructed to identify predictors for autistic children’s WM performance upon entering kindergarten and their relative growth throughout their elementary school years. Approximately 310 students were identified as having autism and were included in the analysis. The following covariates entered the model for controlling purposes: Sex Assigned at Birth, Race, ADHD status, and LD (Learning Disabilities) status. The following covariates entered the model as time-invariant covariates to test the predicting power on the parameter estimates: Socioeconomic Status (SES), Special Education Services for Autism, Student-Teacher Relationship (STR), and Approaches to Learning (ATL).

Results: Results indicate that SES and students’ ATL positively predicted autistic children’s WM performance upon school entry. Students’ ATL positively predicted their rate of growth during the first three years, and negatively predicted their rate of growth during the last three years of elementary school. Student-teacher relationship positively predicted their rate of growth during the last three years of their elementary school years. Further, autistic students who started at a lower standing in working memory upon school entry were more likely to receive special education services during their elementary school years.

Conclusions: Broadly, findings suggest that student demographic characteristics, learning behaviors and school or home environment collectively play an important role in autistic children’s WM development, and these are especially malleable during their elementary school years.
These findings highlight the importance of identifying ways to teach young autistic children from low SES backgrounds learning-related behaviors from a very young age through early intervention programs (e.g., Part C of IDEA, Head Start). Additionally, one important target for these early intervention programs must be enriching their home environments that can remediate the SES-based disparities in young autistic children’s WM trajectories. Further, educators must examine ways that evidence-based WM interventions can be broadly utilized through the public school system. Lastly, school districts’ effort to implement school-wide programs that are designed to foster positive student-teacher relationship is indicated to foster autistic students’ WM development.

429.028 (Poster) Autistic Children’s Visual Sensitivity to Face Movement

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Background: Privileged attention to biological motion (e.g., face movement) is assumed to be a prerequisite for identifying others’ affective and mental states. Therefore, there is a pressing need for studies of large sample sizes and variable age ranges to delineate the mechanism underlying visual insensitivity to biological motion in autism spectrum disorder (ASD). Earlier work using dynamic stimuli with high communicative intent found that autistic people were less likely to look at the face, eyes, or mouth when actors spoke or engaged with participants. It is unclear what drives autistic people’s limited attention to a speaker or engagement with a person’s eyes or mouth. One possibility may lie in the insensitivity to social saliency in ASD, given their diminished activation of social brain areas involved in processing human voices, gaze, emotion, and intention. Alternatively, limited attention to moving eyes and mouth in ASD might be determined by their insensitivity to basic face movements.

Objectives: We focused on the basic movement of the eyes or mouth in guiding attention. We minimized the social effect of the face movement by not using faces with gaze shifting to an object or an articulating mouth as stimuli. Instead, the stimuli face blinked continuously or moved the mouth silently. By comparing the attention to the eyes or mouth of the dynamic face to the same static face, we can conclude whether autistic people are visually sensitive to basic face movement.

Methods: In a large sample (145 autistic and 132 non-autistic participants) ranging from preschoolers to teenagers (3 to 17 years old), we assessed whether autistic participants showed reduced visual attention to basic movement of the eyes or mouth using a free-viewing eye-tracking task.

Results: Figure 1 shows the results. We found that, like non-autistic participants, autistic participants increased eye-looking time when viewing the blinking eyes and increased mouth-looking time when viewing the mouth-moving face. Furthermore, these effects were stable across age, suggesting the presence of a developmentally stable attentional capture by basic face movements in both groups. We also found that autistic participants were less sensitive to basic face movement than non-autistic participants.

Conclusions: Our results suggest that autistic children and adolescents could modulate their visual attention to the basic face movements, but their modulation effect is weaker than non-autistic participants. However, we only tested the basic face movement effect on gaze behavior. Future studies should test the social saliency effect to further understand the mechanism underlying visual attention to face movement in autistic people.


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Background: Visual face recognition - the ability to encode, discriminate, and recognize the faces of others - is fundamentally supported by eye movements and is a common source of difficulty for autistic individuals. Generally, this difficulty is attributed to reduced attention allocation to faces or specific facial features, but few studies have systematically evaluated dynamic patterns of visual attention (i.e., scan paths) during encoding versus recognition stages of face recognition.

Objectives: We aimed to apply a computational modeling approach to determine whether (1) autistic individuals’ eye movement patterns, across encoding and recognition stages, differed from neurotypical peers during a face recognition task.

Methods: Autistic (n=17) and neurotypical (n=15) participants aged 12-17 (M=14.5, SD=1.4) were eye-tracked during a recognition task that consisted of encoding (passive viewing) and recognition (discriminating) phases for faces, inverted faces, monkey faces, and abstract three-dimensional shapes (greebles). To understand how visual processing strategies (i.e., eye movement patterns) directly support encoding and recognition of faces in autism, we applied a novel probabilistic modeling approach to incorporate the spatial (fixation location) and temporal (sequence of fixations) components of eye movements. Participants’ eye movement data were summarized with a hidden Markov model (HMM). To discover common patterns among participants, we used clustering to derive representative HMMs that consisted of data-driven regions of interest (ROIs) and transitional probabilities within and between ROIs.
Results: Overall, autistic participants showed worse recognition performance than neurotypical peers; however, these results were largely driven by differences in inverted face recognition performance. We discovered two distinct eye movement patterns across all participants. A focused strategy was characterized by high probability (>85%) of initial fixations to a small face region, followed by a low probability (<25%) of subsequent fixations to a larger face ROI. An exploratory pattern was characterized by lower probability to a small face ROI (<85%) followed by a larger transitional probability to the larger face ROI (>25%). When evaluating eye movement patterns across encoding and recognition phases, we found that autistic individuals did not alter their eye movement patterns as much as neurotypical participants, who adopted a more focused pattern during encoding and a more exploratory pattern during recognition.

Conclusions: Autistic participants do not alter their visual processing strategy across encoding and recognition phases, which may be an indicator of less efficient face recognition and contribute to face processing difficulties.

**Combined Topics**

**POSTER SESSION — COMBINED TOPICS**

**407 - Combined Topics I**

**407.401 (Poster)** Perceived Stress and Satisfaction before, during and after an Autism Diagnosis, for Autistic Adults and Parents of Autistic Children and Young People in the UK.

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Background:

The Autism Act (2011) was the first condition-specific legislation in the UK stipulating statutory health services provide autism assessment for children and young people (CYP) and adults. A 10-year review of the impact of the act (APPGA, 2021) highlighted high levels of stress and a perceived lack of support by the autistic and broader autism communities. There is currently a lack of understanding of how the diagnostic process itself contributes to perceived stress and what is wanted by key stakeholder communities in terms of support around the autism diagnostic pathway.

Objectives:

1) To identify stakeholder experience of the autism assessment pathway, before, during and after diagnosis, comparing CYP and adult services; and 2) to identify what stakeholders want from the diagnostic process.

Methods:

An online survey was completed by 246 autistic adults and 181 parents of autistic children in the UK. The survey asked about perceived levels of stress, and satisfaction with help and support during three time periods: 1) from initial referral to starting the assessment; 2) during the assessment and 3) the first year after the assessment. Participants also rated the outcomes of diagnostic assessment that were most helpful to them.

Results:

Paired samples t-tests highlighted a significant decrease in stress and a significant increase in satisfaction between time periods 1 and 2, for both CYP and adult services separately (all p<.001). However, there was a significant increase in stress and decrease in satisfaction between periods 2 and 3, for both CYP and adult services (all p<.003) separately - the exception was the increase in adult stress did not reach significance (p=.3).

A MANCOVA for each time period investigated the impact of group (CYP or adult) and gender (male, female, Non-binary) on perceived stress and satisfaction, with ‘years since diagnosis’ as a covariate. There was a significant effect of group on stress in the first time period (p=.021). Parents of those who had accessed CYP services were significantly more stressed than adults accessing services prior to assessment. There was also a significant group by gender interaction for stress during the assessment period (p<.001). Highest levels of stress during the assessment were reported by parents of males accessing CYP services and female adults accessing services. Both parents of non-binary CYP and non-binary adults accessing services also reported higher levels of stress. All other differences were non-significant (p>.05).
The most beneficial aspect of receiving an autism diagnosis was reasonably consistent across the groups of respondents, see Table 1.

Conclusions:

Conclusions

The time periods before and after autism assessment are perceived as stressful by the majority of people and lacking in support. Some groups of stakeholders, i.e. parents of male CYP, female adults and individuals of non-binary gender identity perceive the greatest stress during the assessment process. Few respondents reported benefits in terms of access to health services following diagnostic assessment. Pathways to diagnostic assessment and support outside statutory healthcare services may be less stressful, more helpful and better meet the needs of many of those seeking an autism diagnosis.

407.402 (Poster) Females’ Perceptions of Relative Strengths and Weaknesses of Autistic Males in an Online Dating Context. M. Brosnan and J. Gavin, (1)Centre for Applied Autism Research, University of Bath, Bath, United Kingdom, (2)University of Bath, Bath, United Kingdom

Background:

Research consistently identifies that those with highly stigmatising views towards autism evaluate individuals on the autism spectrum negatively with a reduced willingness for interaction. Within the context of online dating, recent research has also found that low levels of stigmatisation towards autism have a relatively positive effect – specifically, an increased desire-to-date. This suggests the presence of relatively positive views about autism in an online dating context.

Objectives:

To identify both the perceived challenges and benefits of dating/marrying an autistic male and the likelihood of these challenges/benefits being relative weaknesses or strengths in an autistic male.

Methods:

Participants were different for each of 3 studies, but were always females aged 18-25, residing in the UK, who would date a male. Each study involved participants responding to an online dating profile. All participants indicated they were aware of having had contact with an autistic person.

Study 1: 188 participants responded to two open questions asking what they believed to be (1) the challenges, and (2) the benefits - of dating/marrying an autistic person, compared to a non-autistic person. The data were analysed using qualitative content analysis.

Study 2: 208 (new) participants rated their perception of whether the themes identified in Study 1 were likely to be relative strengths or relative weaknesses of an autistic male. One sample t-tests identified which items were significantly different from the neutral mid-point.

Study 3: 216 (new) participants rated the likelihood that a male in an online dating profile had a relative strength or a relative weakness in the themes identified in Study 1 (as in Study 2). T-tests compared an explicit label of autism condition (n=107) with a no label of autism condition (n=109) – otherwise profiles were identical.

Results:

Eleven themes related to the challenges and benefits of dating/marrying an autistic male: 1) Trustworthiness, honesty; 2) Romance, intimacy; 3) Fidelity, faithfulness; 4) Socially interactive with friends; 5) Commitment, loyalty; 6) Equal partner in the relationship; 7) Intellectual abilities; 8) Easy going, flexible; 9) Passionate about interests; 10) Acceptability to family; and 11) Suitability to be a father. Of these, 8 were perceived to be relative autistic male strengths: 1, 3, 5, 6, 7, 9, 10, and 11, and 3 relative autistic male weaknesses: 2, 4, and 8. All 11 themes differed from the neutral mid-point of the scale (p<.001). The profile with the explicit autism label was perceived to be significantly more likely to have all three relative weaknesses (Romance, intimacy; Socially interactive with friends; Easy going, flexible) as well as one relative strength (Passionate about interests). (All p<.05).

Conclusions:
There are 11 themes that females perceived to be relevant when considering online dating with an autistic male. Three of these were perceived to be relative weaknesses in autistic males and may impact on stigmatisation towards autism. Eight were perceived to be relative strengths in autistic males. The addition of an explicit autism label in a profile accentuated all 3 relative weaknesses (and potentially stigmatisation towards autism), yet only accentuated one relative strength.

407.403  (Poster) Determinants of Social Inclusion of Children with Autism Who Exhibit Challenging Behaviors in Sunday School Classrooms

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Background: Autistic children or children with developmental disabilities or delays (DD) are more likely to exhibit behaviors that are perceived as challenging than typically developing peers. Unfortunately, these behaviors may result in limited access to daily activities and exclusion from social settings. Though inclusion in faith-based organizations (e.g., church) is a crucial measurement of an individual’s quality of life, families of children with autism can be excluded from these opportunities due to the children’s challenging behavior. Therefore, understanding the facilitators and barriers to promote the inclusion of children with autism who may engage in challenging behaviors is warranted.

Objectives: The purpose of this investigation is to gain a deeper understanding of the perceptions of caregivers of young autistic children (i.e., 2-8 years old) and children with other DD and Sunday school teachers who work with the same population of children on (a) what the facilitators and barriers are for including young children with autism and other DD who exhibit challenging behavior in Sunday school classrooms, and (b) what additional supports may be needed in Sunday school classes to promote inclusion.

Methods: Qualitative methods via a semi-structured virtual individual interviews were used to investigate the facilitators and barriers perceived by caregivers of young children with autism and DD who engage in challenging behavior and Sunday school teachers who have experience working with those children. The interview protocol consisted of three sections including (1) caregivers’ or professionals’ experiences of inclusion; (2) perceived barriers and facilitators to inclusion; (3) areas of needs to promote inclusion. The data of 13 participants (4 caregivers and 9 professionals) were included and preliminary analyzed using a thematic analysis.

Results: Preliminary findings indicate that caregivers of young children with autism and other DD report a need for more equitable access to Sunday school classes, additional knowledge and training to support children with disabilities for Sunday school teachers, and additional collaboration between caregivers and Sunday school teachers. Sunday school teachers also reported the need for additional training related to supporting children with disabilities in Sunday school classes and the need for building collaborative relationships with caregivers of children with disabilities. Sunday school teachers also felt the inequitable access to Sunday school classes was a result of pastoral and/or leadership decisions instead of decisions made by Sunday school teachers.

Conclusions: Based on preliminary findings, there are three areas of need. First, Sunday school teachers would benefit from training focused on supporting children with disabilities. Second, a collaborative system may be created in which caregivers and Sunday school teachers create plans of support for children with disabilities in Sunday school classes. Such plans can account for the needs of the child (e.g., sensory needs, behavior needs). Finally, and probably most importantly, changes may need to occur at pastoral or leadership levels to create climate change within church settings. If the climate changes within faith-based settings that promote the inclusion of individuals with disabilities the needs of caregivers and Sunday school leaders will be easier to facilitate.

407.404  (Poster) A Systematic Quality Appraisal of Cultural Adaptation of Caregiver-Implemented Interventions for Young Autistic Children

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Background: Many evidence-based practices (EBP) in autism aim to improve outcomes for both autistic children and their families. Caregiver-implemented intervention (CII) is an example of autism EBP for promoting developmental outcomes at both the caregiver and child levels in natural environments (Hume et al., 2021; Barton & Fettig, 2013). It can be especially relevant for marginalized families from diverse cultural and linguistic backgrounds who raise young autistic children due to the flexibility and wide range of targeted skills in CII (Steinbrenner et al., 2020). While literature suggests that cultural adaptation of interventions may be an effective way to ensure equitable implementation, it is still difficult to claim its efficacy among these populations without appraising the quality and rigor of cultural adaptation, and little is known about the process of adaptation in CII.

Objectives: The purpose of this study is to synthesize research evidence on culturally adapted CII and to systematically appraise the quality of cultural adaptation in these studies.
Methods: We conducted a systematic search of the literature that implemented culturally adapted CII with marginalized caregivers of young autistic children. Using three databases, we initially identified 475 articles, then we identified articles that fit our inclusion criteria and based on the PRISMA guideline. Two authors conducted full-text reviews of 30% of each other’s articles (n=5), resulting in 90% interrater reliability. A total of 16 studies met the inclusion criteria. We coded each article to extract information related to (a) participant demographics, (b) intervention providers, and (c) IV and DV. We systematically appraised the quality of cultural adaptation using the Cultural Adaptation Checklist (CAC; Lee et al., under review), a quality indicator tool with 32 items across seven dimensions based on the Ecological Validity Model (Bernal et al., 1995). A total of four authors coded the articles, and the average interrater reliability of eight articles was 75%, ranging from 41% to 91%.

Results: All studies reported some degree of cultural adaptation to an existing model of CII to increase contextual fit with their respective targeted population that comprised a total of 569 caregivers and 495 children. Researchers reported culturally adapting the interventions in more than 10 languages, including Spanish (23.9%), Hindi (18.8%), and Chinese (15.1%). Researchers also reported varying roles of the interventionists who provided the training and coaching to caregivers, including (a) community health workers, (b) parent mentors, and (c) researchers. Studies varied greatly in the quality of their cultural adaptation with an average percentage of 58% (SD=20.4, ranging 22%-94%) when measured by the CAC, which indicates that researchers addressed or reported an average of 18 out of 32 items of the CAC.

Conclusions: While cultural adaptation is a crucial process in promoting intervention delivery with underrepresented populations in autism research, the level and quality of cultural adaptation of CII are inconsistent and varied. Although this may have been affected by conventional practices of reporting research, which may not fully document or reflect the researchers’ efforts of cultural adaptation. Implications for research will be discussed in detail.

407.405 (Poster) Iterative Development of an Echo Autism Program to Improve Healthcare for Autistic Adults

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Background:

Autistic adults face high rates of co-occurring health and mental health conditions and are at increased risk for suicide and premature mortality. However, they experience significant barriers and poor access to healthcare services. One key driver of these barriers is a shortage of healthcare providers with expertise in caring for autistic patients. The Project Extension for Community Healthcare Outcomes (ECHO) framework represents an innovative solution for building capacity for best-practice healthcare for autistic adults. ECHO Autism is a technology-enabled collaborative learning model developed to train community-based providers through mentoring, case-based learning, and guided practice.

Objectives:

The objectives of this project were to develop and iteratively test a new ECHO Autism program for primary care providers (PCPs) focused specifically on adult healthcare.

Methods:

Qualitative and quantitative approaches were employed to develop and test the new program. To inform program development, the perspectives of autistic adults (n=20), caregivers (n=24), and healthcare providers (n=14) were gathered through qualitative interviews and focus groups. Data were analyzed using a phenomenological analysis approach, and results guided the selection of curricular topics and program format. A 6-month ECHO Autism program was then implemented and tested with two consecutive cohorts of PCPs (n=20, and n=17). Satisfaction surveys and qualitative interviews were administered post-ECHO to assess participants’ satisfaction, experiences, and suggestions for improvement.

Results:

The results of key stakeholder interviews revealed both distinct and overlapping themes regarding healthcare barriers and suggestions for healthcare improvement from autistic adults, caregivers, and providers (e.g., system and clinic-level factors; provider-level factors; accommodations; coordination and partnership; and training needs). These themes were used to directly inform the development of the
Conclusions:

Autistic adults, caregivers, and providers expressed similar challenges, barriers, and suggestions for improvement to the healthcare system for autistic adults. These qualitative findings pointed to a need for specific training for primary care providers in delivering patient-centered, comprehensive, and coordinated care that is responsive to the unique needs of autistic patients and their families. Directly incorporating these perspectives into the development and refinement of a new training program for PCPs ensured that the model was both clinically relevant and responsive to the needs of both patients and their healthcare providers. Future research is needed to directly test the effects of the ECHO Autism program on provider practice and patient-level outcomes.

407.406 (Poster) Autistic Adults’ Perceptions of Mental Health Therapy Strategies
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Background:

Autistic adults are at high risk for co-occurring mental health problems and need access to effective and appropriate mental health treatment. Despite growing interest in this topic, research on mental health interventions for autistic adults remains sparse. The relative effectiveness or acceptability of specific mental health strategies among autistic adults has not been previously evaluated. This is an important avenue for investigation because these factors could directly inform personalized treatment and clinician decision-making.

Objectives:

The current study was conducted to gain a deeper understanding of autistic adults’ experiences and preferences regarding specific mental health strategies. A convergent mixed methods design was employed to enable a quantitative understanding of relative helpfulness of a range of mental health strategies, as well as deeper insights into aspects of therapeutic strategies that relate to their helpfulness or ease of use.

Methods:

The sample included 303 autistic adults (ages 21-77) recruited online through the Simons Foundation Powering Autism Research for Knowledge (SPARK) Research Match process. Participants completed a demographic survey, the AQ-Short, and questions about mental health experiences. Participants provided ratings for helpfulness (1=not at all helpful, to 5=very helpful) and ease of use (1=very difficult, to 5=very easy) and answered open-ended questions about each type of strategy they had used (“Please tell us more about how well these strategies worked for you”). Spearman-rank correlations examined associations between autism characteristics and strategy ratings. Open-ended responses were analyzed using a data-driven qualitative content analysis approach.

Results:

Most participants (88.8%) had participated in therapy before. Among this subsample (n=269), most had experience with cognitive strategies (74.7%), followed by deep breathing (53.5%), mindfulness (45.0%), guided imagery/visualization (30.9%), behavioral activation (27.9%), progressive muscle relaxation (PMR) (21.2%), and exposure (19.7%). Behavioral activation, mindfulness, and deep breathing strategies were rated most positively in terms of perceived helpfulness. Deep breathing and behavioral activation were rated as being the easiest to implement, while exposure and cognitive strategies were relatively more difficult. AQ Total Score was negatively correlated with perceived helpfulness of guided imagery (r=-.253, p=.021) and exposure (r=-.353, p=.009), and was negatively correlated with perceived ease of use of cognitive strategies (r=-.179, p=.011), guided imagery (r=-.282, p=.010), PMR (r=-.306, p=.022), and exposure (r=-.319, p=.020). Qualitative results revealed that almost all strategies were seen as helpful for reducing anxiety and improving mood (Theme 1). However, autistic adults reported that most strategies are difficult to generalize to their daily lives (Theme 2), and that they can be difficult to implement (Theme 3) due to both autistic characteristics and specific requirements of each approach. Several participants found some strategies, especially exposure, to be distressing or anxiety-provoking (Theme 4).

Conclusions:
Overall, the results highlight the importance of considering individual differences and preferences of autistic clients when selecting and implementing mental health strategies. Although many autistic adults found mental health strategies to be helpful, some strategies may be less preferred or helpful depending on the autistic adult’s communication and information processing needs. Strategy modifications and support for real-world implementation would be helpful for many autistic clients.

407.407 (Poster) Autism Identity Profile of Autistic Adolescents and Young Adults
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Background:

In recent years, the identity-first language (i.e., autistic person) is considered an appropriate way of expression, strengthened by the autistic community, self-advocacy groups and scholars. Developing an identity is a central developmental stage from during adolescence into young adulthood. Frequently identity development processes are more intricate for autistic adolescents. While some tend to focus on their strengths resulting from their autism diagnosis, others perceive their autism as unfavorable and try to distance themselves from the autism label. The Illness Identity Questionnaire (IIQ) is a measure used to evaluate illness identity in chronic health conditions. It refers to the role and attitudes people develop about themselves related to their health condition and how it integrates into their identity and daily life. Understanding the identity perceptions among adolescents and young adults with ASD at the critical stage of identity development is imperative. In this pioneering study, we adapted the IIQ to autism to shine a spotlight on adolescents’ and young adults’ point of view about how their autism is integrates into their daily life.

Objectives:

To present the autism identity profiles of autistic adolescents and young adults, as illustrated by the IIQ.

Methods:

A total of 102 autistic adolescents and young adults (89% males; 11% females) aged 12 to 25 yrs (M = 18.03, SD = 2.76) completed the self-report IIQ in person. Participants were students in the public education system (57%) and in two transitioning to workforce programs (43%). The IIQ describes four illness identity components: acceptance, enrichment, rejection, and engulfment. Descriptive statistics were used to present demographic variables and identity profiles. Paired sample t-test were calculated to compare between the positive and negative identity components.

Results:

The total positive score of IIQ was significantly higher than the total negative score, t(101) = 6.47, p < .001, d = .43. In detail-the feelings of autism Acceptance were significantly higher than Rejection, t(101) = -5.46, p < .001, d = .54; Enrichment, t(101) = 10.65, p < .001, d = 1.05; and Enrichment, t(101) = 7.52, p < .001, d = .74 feelings. Finally, the Engagement feelings were significantly lower than Rejection, t(101) = 3.66, p < .001, d = .36; and Enrichment, t(101) = -5.21, p < .001, d = .72 feelings. Figure 1 presents the participants’ autism identity profile.

Conclusions:

Adolescents and young adults with ASD present a more positive than negative autism identity profile. However, feelings of rejection and engulfment still constitute a significant share of their entire perceived sense of identity. Previous literature shows that positive identity perception is highly significant for maintaining independence in adult life in the community. Therefore, it is important that parents, teachers, therapists, researchers, and stakeholders, identify and promote positive autism identity at this critical and fragile developmental stage.

407.408 (Poster) Assessing the Efficacy of a Remote Intervention Program to Promote Goal Achievement of Autistic Adolescents
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Background: The adolescence period marking the transition from childhood to adulthood crucially shapes autistic adolescents’ developmental trajectories and provides a basis for independent adult living. Research indicates that developing skills to manage day-to-day life is one of the autistic community’s top research priorities and that autistic adolescents and their caregivers desire autonomy and social participation. Remote intervention characteristics (e.g., incorporating technology and involving natural environments) can
significantly increase adolescents’ motivation and engagement in interventions. Social Participation and Navigation (SPAN), a remote intervention program, combines in-person and web-based interactions to promote individual participation and autonomy goals among autistic adolescents in daily activities and environments.

Objectives: This study aimed to assess the SPAN remote intervention’s initial efficacy among autistic adolescents.

Methods: Twelve autistic adolescents (12–20 years) participated in this single-subject, multiple-baseline design study. They completed a 12-week process, including eight weekly remote sessions with clinicians, with three assessment phases: baseline (T1), pre-intervention (T2), and post-intervention (T3). They used the SPAN website to define measurable short-term goals, set achievement plans, implement the plans while focusing on strengths, and monitor goal achievement. Two self-reported measures assessed the SPAN’s efficacy: the Canadian Occupational Performance Measure for performance and performance satisfaction with the chosen goal and Social Participation and Navigation Self-Efficacy Scale (SPAN SES) for self-efficacy in setting and achieving personal goals. We used Friedman’s nonparametric tests for repeated measures and post-hoc Wilcoxon signed-rank tests to evaluate timeline differences.

Results: Friedman’s tests showed significantly improved goal performance, $\chi^2(2) = 10.61, p < .01$, and satisfaction with performance, $\chi^2(2) = 10.85, p < .01$. As expected, the Wilcoxon analysis revealed no significant differences in performance or satisfaction between T1 and T2. However, all participants reported higher performance ($Z = -2.92, p < .01$) and satisfaction ($Z = -2.86, p < .01$) levels following the intervention (between T2 and T3; Figure 1). In all SPAN SES measurements, the participants highly rated their self-efficacy ($M = 4.12–4.20$), with no significant differences between assessment times.

Conclusions: Preliminary evidence indicated that the SPAN program is an effective remote intervention for achieving autistic adolescents’ personal goals. Implementation studies with larger samples should be conducted.

407.409 (Poster) Exploring the Relation between Early Intervention Provider Characteristics and Provider Performance in Role Play Training Activities

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Background:

Although there is significant need for and interest in effective approaches to training community early intervention (EI) providers in EBIs for autism spectrum disorder (ASD), few studies have explored the association between pre-training provider characteristics (e.g., experiences, attitudes) and provider training outcomes. Understanding the role of provider characteristics on training outcomes is a critical step in designing effective models of training EI providers in specialized ASD interventions.

Objectives:

(1) To characterize pre-training characteristics (i.e., clinical practices, self-efficacy) of EI providers undergoing training in Caregiver-Implemented Reciprocal Imitation Teaching (CI-RIT), an evidence-based naturalistic developmental behavioral intervention; (2) To examine the relation between pre-training characteristics and provider fidelity during CI-RIT role plays, completed as the final stage of training.

Methods:

This study was conducted as part of an ongoing randomized controlled trial of the effectiveness of CI-RIT in Part C EI. Participants include 35 EI providers (Table 1) undergoing a three-stage CI-RIT training process: (1) self-directed online modules, (2) 12-hour synchronous virtual workshop, (3) two individual role plays, completed at least one week apart, in which providers conduct full-length CI-RIT sessions. An RIT Trainer rates role play session components, yielding fidelity scores for each role play. Before training, providers report on their clinical practices using the Provider Practices Survey (28-item questionnaire using 1-to-5 rating scale), focused on use of common intervention strategies (PPS-Child) and coaching techniques (PPS-Caregiver) with families of children with social communication delays. Providers report on their pre-role play confidence in delivering CI-RIT using a Self-Efficacy survey (SE; 7-item questionnaire using 1-to-7 rating scale). Pearson’s correlations were conducted to examine the relation between role play fidelities and (1) pre-training clinical practices (PPS scale sums), (2) pre-role play self-efficacy (SE sum). See Table 2 for a summary of measures.

Results:
Responses on the pre-training PPS indicated that on average, providers “often” used evidence-based intervention strategies with children with social communication delays, reflected in a mean response of 4.14 (SD = .49), and “sometimes” used evidence-based caregiver coaching strategies, reflected in a mean response of 3.47 (SD = .43). SE responses indicated that on average, providers felt “somewhat confident” (M = 5.78, SD = .57) in CI-RIT following the workshop but prior to the training role plays (Table 2). PPS-Child was not significantly correlated with fidelity on Role Play 1 (r = -.15) or Role Play 2 (r = -.10). PPS-Caregiver also was not significantly correlated with fidelity on Role Play 1 (r = -.16) or Role Play 2 (r = -.50). SE was significantly correlated with fidelity on Role Play 1 (r = 0.37, p = 0.04), though not Role Play 2 (r = .28).

Conclusions:

Providers’ typical clinical practices were not associated with CI-RIT fidelity. However, the significant positive correlation between SE and Role Play 1 fidelity, the first activity completed following the workshop, suggests that it is important to further explore provider attitudes (e.g., buy-in, confidence), especially at various stages of training, given the need for optimized approaches to training EI providers with diverse backgrounds and experiences, in specialized ASD interventions.

407.410 (Poster) Characterizing Parent-Reported Reasons for Missing Data and Attrition in an Autism Intervention Trial

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Background:

Clinical trials of caregiver-implemented naturalistic developmental behavioral interventions (NDBIs) for children with autism spectrum disorder (ASD) rarely provide detailed accounts of reasons for missing data and attrition. Published data often excludes participants who are unable to complete procedures, resulting in samples with limited generalizability, and perpetuating challenges of engagement and retention, especially for underrepresented families who may experience significant barriers to clinical trial participation. Although retrospective research on attrition in caregiver-implemented intervention studies has identified associated demographic (e.g., family income, distance to clinic) and psychosocial factors (e.g., parental depression), understanding participant-reported challenges related to clinical trial participation is key to designing study retention strategies for diverse families, and accordingly, more equitable early interventions.

Objectives:

(1) To characterize circumstances reported by participants and study staff as missed activities and attrition occurred in a clinical trial of Caregiver-Implemented Reciprocal Imitation Teaching (CI-RIT), an NDBI for young children with ASD; (2) To offer considerations for participant retention and trial feasibility.

Methods:

Participants included 61 children (78.33% male; Table 1) between 16 and 60 months old (M = 37.64 months, SD = 9.27 months) with suspected or diagnosed ASD and their parents (86% mothers), recruited from a metropolitan Midwestern region. Following remote and in-person baseline study tasks all families received access to a self-directed online program designed to teach RIT. Five weeks later, families were randomized to (1) continue the self-directed program, or (2) receive five weeks of weekly, hour-long telehealth RIT coaching sessions. Families completed remote and in-person outcome measures 10 weeks after baseline, as well as remote play videos at 20 and 30 weeks after baseline. Families were compensated up to $50 for completing all study tasks.

As participants progressed through the study, research staff recorded Note to Files (NTFs), documenting communication with participants in relation to missed study activities, protocol deviations (e.g., significant shifts in participation timelines), and active or passive withdrawals. Two staff members qualitatively coded each NTF to identify attrition and data-loss themes and resolved discrepancies through consensus discussion.

Results:

Nine distinct themes were identified across 120 NTFs (Table 2). The highest-occurring theme was family scheduling limitations (n = 45) (i.e., unable to complete study tasks within the designated timeline due to conflicting obligations). While some families provided non-specific explanations for scheduling difficulties, others offered explanations such as caregiver work schedules and child therapy schedules. Another frequently identified theme was familial emergent life events (ELEs; n = 10), or discrete episodes that the family characterized as stressors (e.g., births, deaths in the family, and employment changes). It is also notable that 37 NTFs documented lack of participant response to contact attempts from research staff, highlighting the challenge of retention in the context of participants’ reported conflicts.
Conclusions:

Methods of collecting and reporting caregiver-reported participation conflicts should be systematically incorporated into clinical trials of NDBIs given their potential to contextualize the generalizability of intervention study results, improve intervention design, and inform proactive engagement and retention strategies that are tailored to experiences of families of young children with ASD.

407.411 (Poster) Creation of a Statewide Care Navigation Model for Families of Young Children with Diagnosed or Suspected ASD
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Background:

Children diagnosed with autism or developmental delays face numerous barriers to accessing therapies and resources (Feinberg, 2021), especially families living in poverty or in rural, medically underserved areas. Family navigation can promote service access by increasing family knowledge and reducing barriers care. To better support families during the diagnostic period, we collaborated with key stakeholders and community partners to create the Tennessee Cares for ASD Navigation Network, a multi-tiered model of family navigation for caregivers of children with confirmed or suspected ASD.

Objectives:

We created a statewide family navigation model to connect families to therapies, community supports, and other resources during the diagnostic journey and evaluated programmatic structure, efficacy, and feasibility over the four-year grant period.

Methods:

As part of a federally funded multi-year grant, we created a family navigation model to serve families of children with ASD and developmental delays (mean age: 47.6 months, 71% male; Table 1). Community providers, stakeholder groups, and clinicians provided input into the structure of the navigation model. Families were referred by community providers such as PCPs, early interventionists, and community agencies. Navigators then contacted families to provide support and resources if needed. Information about each family was recorded in a REDCap database and navigators followed up with families as needed.

Results:

Since network inception, over 2,360 families have received family navigation services. Participating caregivers have been almost entirely female (93.8%) while participating children have been almost three quarters male (71.1%) (Table 1). Navigators follow a pre-defined and stakeholder informed referral structure to online learning opportunities, local advocacy groups, statewide support networks, Part B and Part C intervention and educational systems, and social or financial supports. The network served over 500 families in Year 1 and has grown by at least 25% in following years. Initially the care navigation team provided all families with three mandatory points of contact and three attempts to make each contact. To increase flexibility of our model, at the end of Year 2 we altered the contact structure to provide families with only one point of contact if needed, or multiple points of contact if requested by the family or a clinical provider (Figure 1). For consenting families, contact notes are shared back with referring medical providers.

Conclusions:

Our work demonstrates the feasibility of a stakeholder informed care navigation model that connects diverse families to regional supports. This model was informed by families and partnering groups and has evolved over its lifespan to provide increased flexibility based on family and provider need. This work highlights the importance of meeting with local families and stakeholders to develop a model of family navigation that works for the specific region, team, or community.

407.412 (Poster) Black Families’ Experiences of Autism Diagnosis: Preliminary Parent Feedback to Inform Culturally Competent Care
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Background: Black families face significant barriers in receiving a timely diagnosis of autism spectrum disorder (ASD). Lack of knowledge of autism, distrust of health systems, and racial bias on the part of healthcare professionals all contribute to diagnostic delays (Constantino et al., 2020). These diagnostic delays can result in delayed access to therapies and support services, furthering documented disparities in service access (Stahmer et al., 2019). We surveyed 400 caregivers of Black children with autism to understand their diagnostic experiences and they suggested improvements for clinicians and systems of care. This yielded a rich qualitative data set, from which we now describe family-reported barriers and facilitators to accessing diagnostic care.

Objectives: To describe barriers and facilitators to autism diagnostic care for Black children based upon parental responses to a national survey.

Methods: 400 families of children with autism (mean age: 71 months, 323 male) were recruited from the Simons Foundation SPARK cohort Research Match program. Individuals were eligible if they were data consented for SPARK, were the parent or guardian of a child with autism aged 8 years and under, and the parent and child self-identified as Black or African American (including multiracial families). The SPARK research team sent invitation emails in batches until our recruitment goal of 400 was reached. Respondents completed the survey with their eldest child with autism in mind.

Results: When asked about facilitators to accessing care, most caregivers (n = 281; 71.3%) said their pediatricians provided help during the diagnostic process and during diagnostic follow-up (n = 255; 64.6%) (Figure 1). About 10% of caregivers (n = 41) appreciated that their pediatrician mentioned autism as a specific concern, and over 40% of parents (n = 169) indicated that their pediatricians provided referrals for further evaluation and intervention. Caregivers also endorsed the importance of their state’s early intervention systems in accessing care and providing support (n = 29, 7.2%). Caregivers reported a variety of barriers to accessing care, including diagnostic delay (n = 21; 5.2%), incorrect diagnoses, and provider disagreement with parent concerns (n = 88; 22%). Fifty-seven caregivers (14.2%) reported that their pediatrician did not discuss autism while 31 caregivers (8%) indicated that their pediatrician did not assist with post-diagnostic care. At the systems level, 16 caregivers (4%) encountered barriers related to work/income, 14 (3.5%) related to their ability to access care in their communities, and 31 (7.7%) related to insurance coverage. Finally, approximately 10% of caregivers (n = 41) indicated that they did not pursue a diagnosis because they were not familiar with autism.

Conclusions: Survey responses provided insight into barriers and facilitators Black families experience when accessing autism-specific care for their children. The involvement of pediatricians was both a barrier and facilitator depending on provider behavior and level of engagement. Future work will continue to examine caregivers’ qualitative responses to identify further barriers, facilitators, and ways of improving access to care.

407.413 (Poster) Using Telehealth to Coach Caregivers of Young Autistic Children in South Africa: Intervention Adaptation, Implementation Outcomes, and Caregiver-Child Signals of Change

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Background: Telehealth can meet some service needs of families in under-served, low-resource areas of South Africa. The digital divide can reinforce existing disparities. It is therefore critical to consider cost and feasibility when developing telehealth interventions. The COVID-19 pandemic interrupted an autism clinical trial at the University of Cape Town in South Africa, where Naturalistic Developmental Behavioural Intervention (NDBI)-informed caregiver coaching was being delivered by non-specialists. Researchers pivoted to telehealth.

Objectives: We describe adaptations made to the non-specialist coaching sessions to facilitate telehealth delivery and examine implementation outcomes (acceptability, feasibility, and appropriateness). We assess signals of change in autisticchildren and their caregivers following 12, 1-hour long sessions of telehealth NDBI-informed coaching delivered by non-specialists over smartphones.

Methods: The Framework for Reporting Adaptations and Modifications to Evidence-based Interventions (FRAME) and the Exploration, Preparation, Implementation, Sustainment (EPIS) framework were used to describe adaptations and factors that guided adaptation. A mixed methods approach was used to examine implementation outcomes. Quantitative and qualitative data were analyzed using directed content analysis and descriptive statistics respectively. A single-arm pre-post design was used to assess caregiver and child signals of change. Change over time will be displayed as tabular and graphical summaries. Outcomes included implementation fidelity, behaviors assessed using the Joint Activity Rating Inventory (JERI), and child adaptive behaviour measured on the Vineland Adaptive Behaviour Scales (VABS-3). Quantitative analyses were conducted using SPSS statistics. Implementation data were collected from 9 caregiver-child dyads, 5 non-specialists, and 3 intervention supervisors.

Results: Eleven adaptations were made to the intervention content, delivery context, training and evaluation, and implementation strategies. Adaptations were informed by outer contextual factors (government mandated COVID policies, national internet infrastructure, participant characteristics, and inter-organizational network factors), inner contextual factors (supportive organizational characteristics, leadership, and
Background: Autism spectrum disorder (ASD) is a neurodevelopmental disease and its pathogenesis may be attributed to gene-environment interactions. The development and maintenance of the blood-brain barrier (BBB), the first line of defense in environmental threats, is regulated by a cross talk of WNT and Sonic Hedgehog (SHH) signaling. There are no definitive mechanisms explaining how environmental triggers can lead to ASD although compromised BBB, brain inflammation, immunity, and oxidative stress are involved. The accumulating evidence indicates an association of either exposure to toxic metals including cadmium (Cd) or obesity with ASD or other neurodevelopmental disorders (NDDs) in humans. We hypothesize that environmental factors interrupt the cross talk between WNT and SHH signaling to promote abnormal neurovascular signaling and autism like behaviors.

Objectives: To determine whether whole-life low-dose Cd exposure and post-weaning diet-induced obesity have a synergic effect on brain impairments and WNT/β-Catenin signaling.

Methods: 9-week-old parental C57BL/6J mice were administrated with drinking water containing either 0 or 5 ppm Cd for one week prior to breeding. After weaning, the offspring were continuously exposed to Cd and were fed either a normal diet (ND, 13% kcal from fat) or a high-fat diet (HFD, 60% kcal from fat) until sacrifice at 24 post-weaning weeks. The Cd accumulation and pathological changes in DNA oxidation, glial response, inflammation, blood-brain barrier (BBB) integrity, and core components of the β-catenin destruction complex were analyzed by ICP-MS, immunofluorescence, and quantitative PCR. Mouse behaviors were measured by usual standard assays. All data were presented as mean ± SD and analyzed by two-way ANOVA with diet-by-strain interaction. Significance was set at p<0.05.

Results: Cd exposure but not post-weaning HFD feeding significantly increased its accumulation in cortexes, hippocampi, and cerebella of the offspring brains with whole-life low-dose Cd exposure. Cd exposure or HFD can induce increased oxidative DNA damage in cortex and hippocampus but not in cerebellum. Moreover, HFD dramatically enhances Cd-induced the DNA damage, especially in the pyramidal cells of CA1-3. Compared to the control offspring, both HFD- and Cd-exposed mice demonstrate activation of microglia and astrocytes. More severe glial activation was observed in Cd-exposed mice than that in HFD-fed mice, which is exaggerated by HFD. Cd exposure only can increase the transcriptions of TNFα and IL-10. The BBB is damaged only in Cd-exposed offspring but aggravated by HFD. Mice fed Cd but not HFD exhibited deficits in social novelty and increased grooming but not social preference deficits. Mice fed Cd and/or HFD traveled a less total distance in the open field assay compared to vehicle fed a normal diet. While mRNA of WNT/β-Catenin pathways was not markedly changed, a Cd dose dependent increase in active β-catenin and phosphorylated (Serine 9) GSK3β was observed.
Conclusions: Whole-life low-dose Cd exposure or post-weaning HFD can cause oxidative stress and glial activation in offspring plus disrupts the BBB integrity. Post-weaning HFD exacerbates Cd-induced brain impairments. Cd dosing impacts the canonical WNT/β-Catenin signaling which is linked barrierogenesis. Further experiments will determine the relationships of these observations to autism-like behavior in Cd exposed offspring.

419.402 (Poster) A CAD System for Classifying Autism Spectrum Disorder Using Diffusion Tensor MRI
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Background: The term autism spectrum disorder (ASD), or autism, refers to a group of conditions in which social skills, repetitive behaviors, speech, and nonverbal communication are challenged. Conventional diagnoses are time-consuming and tedious because they require repeated interviews and evaluations of the autistic subject, on the other hand, neuroimaging techniques provide a quicker and more objective method of diagnosis. Despite numerous investigations identifying different aspects of brain dysfunction, it was still difficult to identify consistent similarities between different brain abnormalities, whether in shape, functionality, or connectivity.

Objectives: In this work, diffusion tensor MRI imaging data (DTI) of the brain is used to infer connectivity anomalies in an autistic brain. Based on brain imaging data, white-matter connectivity is analyzed, and a CAD framework is used to classify autistic subjects, and identify which features are most significant. Our objective was to test our framework on 225 subjects using a large data set obtained from the ABIDE-II database, from 5 different sites.

Methods: Anonymized MRI scans were obtained for 225 subjects (125 autistics and 100 typically developed, ages 5-46.6 years) from ABIDE-II database. The framework mainly consists of three stages: first, a preprocessing step to reduce artifacts and eliminate non-brain tissues, including skull stripping and eddy current correction. In the second stage, feature extraction, WM integrity is examined by extracting most prominent features representing WM connectivity from DTI. Six different features (fractional anisotropy, axial and radial diffusivities, mean diffusivity, and skewness) are calculated based on the 3 eigenvalues $\lambda_1$, $\lambda_2$, and $\lambda_3$ on each voxel, and atlas-based segmentation technique is used to allocate features for each area, on John-Hopkins white matter atlas. After that, interactions of WM features between different areas in the brain, demonstrating correlations between WM areas’ features were used, and feature selection among those correlations are made using recursive feature elimination with cross-validation. Finally, a set of 5-fold cross validated classifiers were employed to get the final diagnosis.

Results: To ensure system robustness, 5-fold cross validated classifiers were. To obtain the subject global diagnosis decision, multi-stage system is used. First, feature selection using RFE-CV with different kernels, then $n$ selected features are fed to next set of classifiers. LSVM kernel provided best global distinction being autistic given these features, providing global decisions, which achieved a cross-validated diagnostic accuracy of 99%. The top brain area pairs contributing to the decision is also highlighted by the algorithm.

Conclusions: This promising work provides not only fast and high early-stage diagnostic accuracy, but also allows identifying the localized abnormalities for each individual subject, characterized by the areas of highest rank, which may aid in understanding the autistic subject behavior and help the clinician to deliver a tailored personalized treatment. More medical interpretation to map the impacted regions to the corresponding expected behaviors is needed to validate the personalized maps. Using diffusion tensor imaging data, these promising results emphasize the ability of neuroimaging-based techniques to detect abnormal brain connectivity and provide an accurate diagnosis.

419.403 (Poster) Behavioral-Driven ASD Diagnosis Using Structure MRI
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Background: Autism spectrum disorders (ASD), according to Diagnostic and Statistical Manual of Mental Disorders (DSM-5), are neurodevelopmental disorders with common impairments in social communication and interactions, restricted and repetitive behavioral. The three differ regarding severity, associated language and cognitive abilities, and symptom pattern. The Centers for Disease Control and Prevention in the US has reported that, for the last few years, ASD prevalence has been increasing, especially among children, reaching almost one in 58. The gold standard of diagnosing ASD is a combination of Autism Diagnostic Observation Schedule (ADOS) and Autism Diagnostic Interview-Revised (ADI-R). An alternative diagnostic method for ASD is the Social Responsiveness Scale (SRS), which is quickly accomplished, objective, economic, easy to use, and increasingly being used as a clinical screening without instrument

Objectives: In this study, we are classifying ASD by identifying subjects in a multi-dimensional behavioral space. A multi-dimensional behavioral space is defined by an array of SRS behavioral score for each subject. Thus, we identify location of each subject on the spectrum via identifying his severity within each behavioral module.
Methods: ABIDE II is the dataset utilized in this study. It is the second iteration of the Autism Brain Imaging Data Exchange (ABIDE), which aims to enhance the scope of brain connectomics research in ASD. ABIDE II dataset comprises 521 individuals with ASD and 593 TD subjects. First phase, we classify the severity of each behavioral category as they are defined in the SRS module (Communication, Mannerism, Cognition, Motivation, Awareness, Total). The severity levels are defined as follow: (i) TD, (ii) mild, (iii) moderate, and (iv) sever, such that mild, moderate, and sever are all considered to be ASD. Second phase, we combine the predicted severity scores for each behavioral category to get a final classification for each subject. At the end of the second phase, we propose a CAD report, illustrated on 2 randomly selected case studies from the testing set, which maps the results of phase one with the most contributing cortical features, and maps the final diagnosis of phase two with the behavioral report.

Results:

To ensure system robustness, we perform 5-fold cross-validation. ASD average classification accuracy of each of the behavioral modules of the SRS (awareness, communication, cognition, motivation, mannerism, and total) is (85%, 91%, 93%, 89%, 95%, 93%) respectively. Using each of the behavioral module to train a machine learning model to provide a global diagnosis for each subject with average classification accuracy of 94%.

Conclusions:

In this study, we propose a novel comprehensive machine learning framework to localize the morphological cortical anomalies associated with different ASD behavioral traits. The localized cortical anomalies are used to classify each subject’s behavior into multiple severity score, and aggregate those scores into a final diagnosis. In this study, we assist physicians to map ASD behavioral traits to the corresponding cortical morphological anomalies.

419.404 (Poster) Epigenetics of Autism Spectrum Disorders: A Multi-Level Analysis Combining Epi-Signature, Age Acceleration, Epigenetic Drift and Rare Epivariations Using Public Datasets

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Background:

Epigenetics of Autism Spectrum Disorders (ASD) is still an understudied field. However, most studies on the topic focused on mere differences between cases and controls.

Objectives:

The aim of the study was to conduct a more in-depth analysis of the role of epigenetics in autism, using an original multi-level approach moving from genome-wide epigenetic analysis (EWAS) and meta-analysis to improve the precision and accuracy of effect estimates to the incorporation of more specific epigenetic analysis such as biological aging, epigenetic drift and rare epigenetic variations.

Methods:

We used publicly available datasets from blood (n=3) and brain tissues (n=3), which were analyzed separately. Firstly, we evaluated for each dataset and meta-analyzed the differential methylation profile between cases and controls. Secondly, we analyzed age acceleration (using the Horvath, Hannum, and GrimAge clocks), epigenetic drift and rare epigenetic variations (epi-variation). Epi-variations were identified as aberrant beta-values (defined as extreme outliers) falling outside a reference methylation range obtained by the methylation profiles of a reference population and calculated as follows: upper value=Q3+(k*IQR); lower value=Q1-(k*IQR); where Q1 is the first quartile, Q3 the third quartile, IQR (Interquartile range)=Q3-Q1 and k=3. For each case, extreme outlier values of single methylation profiles were annotated and classified as hyper-methylated or hypo-methylated to controls' relative probe median values.

Results:

A significant epi-signature of ASD was reported in blood samples but not in brain specimens. We did not observe significant age acceleration in ASD, while epigenetic drift was significantly higher compared to controls. Rare epigenetic variations (epi-variations) were reported in 41 genes, 35 of which were not associated with ASD before this study. Gene enrichment analysis showed that epimutated genes were linked to biological pathways deemed to have a role in ASD pathogenesis as well as to previously not reported molecular processes (neuropeptide Y and its receptors).
Conclusions:

Blood epi-signature could represent a potential tool for diagnosis and prognosis of ASD. The small sample of subjects with available brain specimen data could have limited the ability to detect an epi-signature also in brain tissues.

419.405 (Poster) Real-Life Pharmacological Treatment of Severe Problem Behaviors in Adults with ASD: A Longitudinal Prospective Study

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Background:

Autism Spectrum Disorders may be burdened by the presence of irritability and aggression. More than 20% of autistic individuals exhibit moderate to severe irritability and aggression during their life-time. These symptoms may impair access to care and treatment for autistic individuals and caregivers and represent a major negative prognostic factor for long-term outcomes. Severe irritability and aggression (both towards self and/or others) in ASD are often not responding to conventional sedation treatment and it has been reported that antipsychotics are usually burdened by more side effects compared to other clinical populations.

Objectives:

Our primary aim was to investigate treatment of severe problem behaviors in a cohort of autistic adults in real-life clinical practice.

Methods:

We enrolled all consecutive admissions for pharmacological consultation for severe problem behaviors since September 2020. Subjects should have been already diagnosed or re-assessed by a senior psychiatrist expert in ASD and behavioral intervention for problem behaviors have been ineffective or only partially effective. Before evaluating pharmacological treatment, medical problems and comorbid psychiatric disorders have been addressed and treated if present. Pharmacological treatment has been rationalized as follows: 1) if no medication was already administered, aripiprazole was started and titrated eventually up to 30 mg/die 2) if a medication history was already available, treatment was decided according to previous not efficacious treatment or presence of side effects with two potential outcomes a) optimization of present therapy with reduction of the number of medications and titration of the selected medication to the maximum dosage b) introduction of a first generation antipsychotic with low side effect (zuclopenthixol or levomepromazine). Efficacy of treatment was defined as a reduction of 30% score at the ABC irritability subscale after 2 weeks. UKU scale was used for side effect evaluation. Subjects were follow-up every month for up to two years.

Results:

Overall 50 participants were evaluated. Two individuals have comorbid medical conditions in which treatment with antibiotics and antiinflammatory drugs resulted in complete recovery. 15 were drug-naive and were started with aripiprazole with efficacy. Of note, two patients after 20 months started to display inefficacy of aripiprazole and were switched to zuclopenthixol with benefit. Of the remaining 33 subjects, nearly half (n=15) benefited from a reduction of the number of medications administered and a titration to the maximum of the antipsychotic of choice (olanzapine n=4, haloperidol n=1, levomepromazine n=4, aripiprazolo n=1, zuclopenthixol n=5). All subjects were co-administered a mood stabilizer (valproate n=10, gabapentin n=5). 18 subjects were switched to a first generation antipsychotic after inefficacy of the administered medication (risperidone n=7, quetiapine n=8, fluvoxamine n=2, cariprazine n=1).

Conclusions:

Real-life pharmacological treatment of severe problem behaviors in ASD is extremely complex. As a matter of fact, only aripiprazole and risperidone are FDA-approved drugs for irritability in ASD. However, in clinical practice and in profound autism these medications may prove potentially inefficacious. Our cohort showed a reduction in problem behaviors in all the included subjects, with optimization of the treatment already in place as well as with the introduction of first-generation antipsychotics.

419.406 (Poster) RNA Sequencing of Blood from Sex- and Age-Matched Discordant Siblings Supports Immune and Transcriptional Dysregulation in Autism Spectrum Disorder

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Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental condition with onset in early childhood, still diagnosed through clinical observation and psychodiagnostic tools due to the lack of laboratory biomarkers. Early detection strategies would be especially useful in screening high-risk newborn siblings of children already diagnosed with ASD.

Objectives: To search for ASD-associated blood transcriptomic biomarkers possibly applicable within “high risk” families, where one child has already received an ASD diagnosis.

Methods: Total RNA was extracted from peripheral mononuclear blood cells and RNA sequencing was performed, comparing 31 ASD and 31 unaffected siblings (SIB) matched by sex and age, later reduced to 27 ASD-SIB pairs to control for pharmacological treatment. Sequencing libraries were prepared using the TruSeq Stranded mRNA kit (Illumina, Inc.) and the final library was sequenced by 100 bp paired-end sequencing on NovaSeq to generate 40 million clusters per sample. This approach delineates the coding transcriptome using Oligo-dT beads to capture polyA mRNA tails. After read alignment and transcript quantification, differential gene expression profiling was performed applying both an unpaired and a paired model, followed by Weighted Gene Correlation Network Analysis (WGCNA).

Results: Differential gene expression profiling, performed applying an unpaired model, identified two immune genes, EGR1 and IGKV3D-15, significantly upregulated in ASD patients (both p-adjust = 0.037). WGCNA identified 18 co-expressed modules. One of these modules was downregulated among autistic individuals (p = 0.035) and a ROC curve obtained using its eigengene values yielded an AUC of 0.62. Genes in this module are primarily involved in transcriptional control and its hub gene, RACK1, encodes for a signaling protein critical for neurodevelopment and innate immunity, whose expression is influenced by various hormones and known “endocrine disruptors”.

Conclusions: These results indicate that transcriptomic biomarkers can contribute to the sensitivity of an intra-familial multimarker panel for ASD and provide further evidence that neurodevelopment, innate immunity and transcriptional regulation are involved in ASD pathogenesis.
additional medical exams which would not have otherwise been prescribed, mainly including brain MRI, EEG, EKG, and/or cardiac ultrasound. A positive outcome was obtained in 12/25 (48.0%) of these additional medical tests.

Conclusions: This study confirms the satisfactory diagnostic yield of aCGH in clinical settings and the role of neuronal/synaptic genes in ASD. Furthermore, it underscores the potential contribution of aCGH for better, more in-depth care of children with autism when genetic results are analysed also with a focus on patient management.

419.408 (Poster) Measuring Autistic Burnout: A Preliminary Investigation of the Reliability, Validity and Factor Structure of the Aaspire Autistic Burnout Scale
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Background: The autistic community has described the experience of autistic burnout as chronic exhaustion as a result of being autistic in an unaccommodating predominantly non-autistic world; autistic burnout has also been described as loss of skills and abilities, impaired thinking, increased avoidance/withdrawal and increased sensory sensitivity (Raymaker et al., 2020; Higgins et al., 2021). In social media and qualitative studies to date, autistic people report experiencing burnout as a consequence of camouflaging and minority stress, and describe it as a risk factor for poorer wellbeing. In response to the need to better understand autistic burnout, Raymaker and colleagues from the AASPIRE research team developed the first self-report measure of autistic burnout, the Autistic Burnout Scale (ABS), which shows promising preliminary measurement properties. However, their initial psychometric evaluation was underpowered to assess the measure’s dimensionality and factor structure.

Objectives: This study is part of a larger project exploring camouflaging, autistic burnout and their psychosocial correlates in autistic adults. We will psychometrically validate the ABS by exploring the measure’s internal consistency, test-retest reliability, structural validity, discriminant validity and construct validity in 350 autistic and 100 non-autistic adults.

Methods: Autistic adults (currently n=231; 19- 76 years; 69.7% Female; 81.4% White; 81.4% professionally diagnosed) have been recruited to date through Prolific, autism organizations, and social media in Australia and internationally. Data collection is ongoing and will be completed by end of November 2022 when a sample of approximately 350 autistic adults (as per COSMIN guidelines for factor analysis) and a non-autistic comparison group of approx. 100 adults will be recruited. Participants complete online self-report measures on demographic information, autistic traits, autistic burnout, camouflaging and mental health measures. A subsample of 129 participants has completed the same measures in a follow-up study 12+ months after the initial phase, and they also completed the Sydney Burnout Measure (Parker & Tavella, 2021). Reliability analyses, correlation analyses and Exploratory Factor Analysis (EFA) will be carried out. Stepwise Discriminant Functional Analysis (DFA) will explore whether the ABS can differentiate between autistic and non-autistic participants, as well as between autistic participants who reported recently having experienced or are now experiencing burnout and those who did not.

Results: Based on preliminary analyses of n=231, the ABS demonstrates excellent internal consistency (Chronbach’s Alpha .97; inter-item correlations’ range .26-.88, mean=.51) and construct validity: greater experiences of autistic burnout are associated with more autistic traits (r=.28), more camouflaging (r=.35), greater exposure to vulnerability events (r=.33) and experiences of depression (r=.45) and anxiety (r=.45). Exploratory and discriminant functional analyses will be run, and in our presentation, we will share our findings on the dimensionality of the ABS and on group differences.

Conclusions: Preliminary analyses show promising psychometric properties for the ABS. We discuss the findings in light of the study’s strengths and limitations, we consider the implications of validating the first measure of autistic burnout for use in future research, and outline some future directions for empirically exploring individual and psychosocial risk and protective factors implicated in the relationship between autistic burnout and mental health.

419.409 (Poster) Psychosocial Factors Associated with Camouflaging and Its Relationship with Mental Well-Being in Autistic and Non-Autistic People: A Mixed Methods Systematic Review
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Background: Camouflaging (i.e., hiding or masking one’s autistic traits in social situations) is consistently associated with poorer mental well-being in autistic and non-autistic people. As camouflaging is socially motivated and occurs within a sociocultural context, it is likely influenced by psychological and social experiences. Qualitative and quantitative literature has provided emerging evidence of psychological and sociocultural characteristics and experiences implicated in camouflaging and its relationship with mental health. However, no review to date has systematically integrated quantitative and qualitative evidence to identify the individual psychological or social factors implicated in camouflaging and its relationship with mental well-being.
Objectives: This mixed method systematic review aimed to critically synthesise qualitative and quantitative research on psychosocial factors associated with camouflaging and its relationship with mental well-being in autistic and non-autistic people.

Methods: This review was preregistered with PROSPERO (registration number: CRD42021264865). Six electronic databases were searched, followed by grey literature searches and hand searches of reference lists. Following a convergent integrated approach to data synthesis, quantitative data were transformed and synthesised with qualitative data to perform a thematic synthesis. Two autistic advisors provided input to ensure that the identified themes and subthemes accurately and respectfully reflected their understanding of the camouflaging experiences of the autistic community.

Results: Fifty-two studies (37 qualitative, 10 quantitative, and five mixed methods) published between 2001 and June 2022 were included. Three themes comprising seven subthemes relating to psychosocial correlates of camouflaging were identified: (1) social norms and pressures of a largely non-autistic world (subthemes: expectations to conform to social norms; societal prejudice and stereotypes), (2) social acceptance and rejection (subthemes: defending oneself from bullying and victimisation; seeking acceptance and connection), and (3) self-esteem and identity (subthemes: internalised stigma and shame; acceptance of autistic identity; disclosure and self-advocacy). An additional four themes comprising nine subthemes related to psychosocial consequences of camouflaging for mental well-being: (1) a pragmatic way of exerting individual agency and control (subthemes: achieving and functioning in a largely non-autistic world; managing others’ impressions); (2) overlooked, under-supported, and burnt out (subthemes: overlooked difficulties and unmet needs; delayed diagnosis; autistic burnout); (3) impact on social relationships (subthemes: gaining acceptance, but relationships are not authentic); and (4) low self-esteem and identity confusion (subthemes: low self-esteem; identity conflict and confusion).

Conclusions: Camouflaging is a largely socially driven response influenced by an interplay of psychological and social experiences, including non-autistic norms and expectations, stigmatisation, and the need for social acceptance. While camouflaging presents some social benefits and opportunities, it also comes with serious costs to mental well-being, as it negatively impacts one’s social relationships, self-esteem, and identity and contributes to experiences of being under-supported and burnt out. Our review calls for systemic change to create psychosocial environments where autistic individuals are accepted, valued, and empowered to drop the mask and live and relate with others in more authentically autistic ways.

419.410 (Poster) How Does Autistic Camouflaging Relate to, and Differentiate from, Social Anxiety, Fear of Negative Evaluation and Social Autistic Traits?

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Background: Autistic people often report using a range of strategies, known as camouflaging, to mask or hide their autistic characteristics and to ‘pretend to be normal’ when navigating non-autistic social environments. Camouflaging is described as exhausting, and camouflaging has been consistently positively associated with more mental health difficulties; camouflaging can also contribute to missed autism diagnosis, and needs being overlooked. Although some researchers have argued that camouflaging may overlap considerably with related constructs, such as social anxiety, fear of negative evaluation (FNE) and social autistic traits, the construct validity of camouflaging and its potential overlap with other related constructs has not yet been empirically investigated.

Objectives: This study examined the construct validity of the Camouflaging Autistic Traits Questionnaire (CAT-Q), a widely used self-report measure of camouflaging behaviour. Specifically, we aimed to determine the relationship between camouflaging, social anxiety, FNE and social communication autistic traits; and to explore whether CAT-Q items could be disambiguated from items conceptualised to measure social anxiety, FNE and social autistic traits.

Methods: This study utilised data from a larger study exploring the psychosocial correlates of camouflaging. Data were collected in 2020 and 2021. Participants were 308 professionally diagnosed (n=265) and self-identified (n=43) autistic adults (men=88, women=189, another gender identity/gender not disclosed=31; mean age=36.2, SD=11.6, 18-76 years). We ran correlational analyses and three exploratory factor analyses combining the CAT-Q camouflaging items with items from measures of social anxiety (measured using the Social Interaction Anxiety Scale/Social Phobia Scale; SIAS/SPS), FNE (measured by the Brief Fear of Negative Evaluation scale; BFNE) and social autistic traits (measured by the Broad Autism Phenotype Questionnaire; BAPQ) respectively, to explore whether separable camouflaging and social anxiety, FNE and social autistic traits’ factors could be identified.

Results: Associations between age, sex and diagnostic status (professionally diagnosed vs self-identified) and camouflaging were small and/or non-significant. The CAT-Q total score was positively associated with the BAPQ pragmatic language and aloof subscales’ score (r=.33), with social anxiety (.45) and with FNE (.39), all with small to medium effect sizes, suggesting they are related, but also independent, variables. In the factor analyses, the CAT-Q items differentiated well from social anxiety, FNE and social autistic trait items, as the camouflaging items largely loaded together onto different factors from the social anxiety, FNE and social communication autistic
traits’ items. A few CAT-Q items, mostly from the Assimilation subscale, loaded together with social anxiety or the BAPQ social communication items.

Conclusions: The CAT-Q camouflaging items were related to, but also largely separable and clearly distinguishable from, items measuring social anxiety, FNE and social autistic traits, strengthening confidence in the construct validity of camouflaging as measured by the CAT-Q. Some individual items may require further refinement. Future research should replicate these analyses and use convergent approaches, such as network analysis, to further advance the construct validity of the CAT-Q so as to continue to improve our ways of asking about, measuring and understanding camouflaging.

419.411 (Poster) Psychosocial Predictors of Camouflaging and the Role of Autistic Identity and Social Support in the Relationship between Camouflaging and Mental Well-Being in Autistic Adults

Background: Camouflaging refers to strategies used by autistic people to hide or mask their autistic characteristics in social situations, to "pretend to be normal." While at times helpful and necessary for social survival in a largely non-autistic world, camouflaging has been consistently associated with poorer mental well-being. Although camouflaging is a social experience driven by psychosocial motivations and affects one’s well-being, identity, and relationships, most quantitative research to date has focused on exploring individual differences in camouflaging behaviours. Several qualitative studies have explored the psychosocial motivations and impact of camouflaging. However, very little quantitative research has examined the psychological or social factors associated with camouflaging or implicated in its relationship with mental well-being.

Objectives: This study, part of a larger project exploring predictors, continuity, and change in camouflaging and its relationship with well-being in autistic adults, aims to explore the following research questions: (a) Do specific theoretically and empirically supported psychological (i.e., greater fear of negative evaluation) and social experiences (i.e., more vulnerability events, perceived stigma, perceived strength of social norms and degree of tolerance for deviance in society, and one's desire to individuate or maintain social harmony) predict more camouflaging behaviours? and (b) Does autistic identity and perceived social support moderate the relationship between camouflaging and mental well-being, such that the relationship between camouflaging and poorer mental well-being is weaker for those with stronger autistic identity and perceived social support?

Methods: This study was developed in partnership with an autistic consultant. Three hundred and eight autistic adults (18-76 years; 61.4% females; 77.3% White; 86% professionally diagnosed) were recruited through Prolific, autism organisations, and social media in Singapore, Australia, and internationally between 2019 and 2021. Participants completed online self-report measures on demographic information, autistic traits, camouflaging (using the Camouflaging Autistic Traits Questionnaire; CAT-Q; Hull et al., 2017), and the aforementioned psychosocial factors. Hierarchical linear regression analyses were performed to investigate whether psychosocial factors predicted camouflaging, after controlling for age, gender, and autistic traits. Moderation analyses are currently underway to examine the moderating role of the proposed psychosocial factors in the relationship between camouflaging and mental well-being.

Results: Greater fear of negative evaluation, greater vulnerability to negative events, and perceptions of stronger social norms and lower tolerance for deviance significantly predicted more camouflaging behaviours, over and above age, gender, and autistic traits (14.1% additional variance in camouflaging explained by psychosocial factors; 28.3% of variance explained by the final model with all predictors). Moderation analyses are ongoing, and in our presentation, we will share findings from these analyses on the role of autistic identity and perceived social support in the relationship between camouflaging and mental well-being.

Conclusions: Camouflaging as a social coping strategy is likely influenced by individual psychological characteristics and perceived/ experienced sociocultural pressures to conform. We discuss our findings in light of the study's strengths and limitations and in relation to psychological and societal-level changes required to reduce the pressures on autistic individuals to camouflage.

POSTER SESSION — COMBINED TOPICS

427 - Combined Topics III

427.406 (Poster) Synaptic Density Marker, SV2A, Is Reduced in Autistic Adults
Background: Altered synaptic structure and function are thought to be key neurobiological mechanisms underpinning autism, as suggested by genetic (Bourgeron, 2015), post-mortem (Nicolini et al., 2015) and animal model (Tang et al., 2014) research. Yet, until now, synaptic density in autistic people in vivo has not been quantified.

Objectives: Here, we used the ¹⁸F-UCB-J positron emission tomography (PET) tracer to investigate synaptic density differences in autistic adults. We hypothesised 1) altered synaptic density in autistic compared to neurotypical adults in subregions of the fronto-temporal cortex (Hutsler & Zhang, 2010; Nicolini et al., 2015), the anterior cingulate cortex (Nakamura et al., 2011), and the amygdala (Schumann & Amaral, 2006) and that 2) synaptic density correlates with the extent of autistic traits.

Methods: We recruited 10 autistic adults (8 male, 2 female), aged 19–58 years, and 8 sex and age matched neurotypical controls. No participants had co-occurring physical health or developmental conditions. PET imaging was undertaken using the ¹⁸F-UCB-J radiotracer, which binds to the synaptic vesicle protein 2A (SV2A). SV2A is found on pre-synaptic boutons; therefore, higher distribution volume (Vi) of ¹⁸F-UCB-J denotes greater synaptic density (Finnema et al., 2016). We measured the extent of overall autistic traits in both groups using the AQ10, and specific autistic features in the autistic group only using the Autism Diagnostic Observation Schedule, second edition (ADOS-2).

Results: ¹⁸F-UCB-J V_i was significantly lower in autistic compared to neurotypical adults (figure 1) in the following hypothesised regions: right frontal cortex (t16 = -2.19, p = .047, d = .96), right dorsolateral prefrontal cortex (t16 = -2.27, p = .039, d = 1.01) and anterior cingulate cortex (t16 = -2.16, p = .046, d = 1.01). Additionally, lower ¹⁸F-UCB-J V_i in autistic adults was found in the right orbitofrontal cortex (t16 = -2.68, p = .016, d = 1.23), left parahippocampal gyrus (t16 = -2.73, p = .015, d = 1.30), posterior cingulate cortex (t16 = -2.38, p = .030, d = 1.13), left dorsal cerebellum (t16 = -2.78, p = .014, d = 1.31) and left nucleus accumbens (t16 = -2.43, p = .027, d = 1.12).

In all the aforementioned brain regions, and throughout grey matter, reduced synaptic density correlated with more (overall) autistic traits across groups (r = -.59, p = .012, figure 2a), and in neurotypicals alone (r = -.93, p < .001, figure 2b). Within autistic adults, lower synaptic density was particularly associated with communication challenges as measured by ADOS-2, for example in the anterior cingulate cortex (r = -.84, p = .017).

Conclusions: We report the first in vivo evidence that autistic adults have a significant reduction in synaptic density, and that this is associated with more autistic traits. Future work is required to determine how these differences arise and if they are related to variation in outcomes within autistic people.

427.407 (Poster) Genetic and Clinical Diagnoses Associated with Developmental Regression in Children with and without Autism
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Background: Causes of developmental regression (DR) are poorly understood. Some diagnoses are associated with DR like autism spectrum disorder (autism) and others require DR, like childhood disintegrative disorder. There are recognised monogenic causes, including Rett’s syndrome, and also epileptic, including Landau Kleffner Syndrome. Phenotyping children with DR and assessing diagnostic yield of investigations will advance best practice care. Furthermore, improving knowledge of causes of DR enables potential for novel treatment discovery.

Objectives: To describe clinical characteristics and identified diagnoses of DR, with and without pre-existing autism; to provide information about use and utility of genetic testing and neuroimaging for diagnosis

Methods: A retrospective study identified children aged 0-18 years referred to a tertiary clinical genetics service with DR by searching a clinical database using pre-determined keywords over the period 1/1/18 and 5/8/21.

Results: Of 307 children identified as possibly having DR, there were 68 duplicate entries, 117 with no documented DR and 22 aged over 18 years. The final cohort of 100 children included 69 males. 60 children with DR had a prior diagnosis of autism, 71 children had intellectual disability (ID) or global developmental delay (GDD), 39 had a diagnosis of autism and ID/GDD, and 6 children with autism out
of 15 children had pre-existing epilepsy/seizures. 86% children were aged less than 48 months at onset of DR, with a mean age of DR onset of 24.6 months for children without autism and 33.4 month for children with autism. The most frequent DR domain was speech and language loss for children with and without a diagnosis of autism, followed by loss of mixed skills >1 developmental domain. An explanatory genetic diagnosis was made for 30 children (30%) with 26 different genetic diagnoses. A further 3 children (2 children with autism) received MRI brain diagnosis after inconclusive genetic testing. Twelve (20%) children with autism and 18 children (45%) without autism obtained a genetic diagnosis thought to explain DR. Chromosomal microarray (CMA) was requested in all 100 children with 5 results, all children with autism, thought to explain DR. Genomic testing (gene panels or exome sequencing) was completed in 57 children (57%), 25 children with autism and 32 without an autism diagnosis. Genomic results were thought to explain DR for 7 children with autism (28%), and 18 children without (56%).

Conclusions: Age of onset and types of regression were similar to other studies and similar for children with and without autism. This study reports heterogeneous identified genetic and neuroimaging causes of DR in children. Genomic testing provides higher diagnostic yields than CMA and neuroimaging, and had a higher diagnostic yield for children without a pre-existing diagnosis of autism. Neuroimaging may aid diagnostic clarification for children with otherwise inconclusive genomic results. Identifying children with DR early through enhanced phenotyping, and improved awareness and knowledge of the breadth of disorders causing DR allows for earlier use of optimal high yield investigations. An earlier diagnosis enables use of evidenced-based management with potential to improve child outcomes.

427.408 (Poster) Definitions and Measures Used for Loss of Developmental Skills in Autistic Children
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Background:

Research and evidence informed clinical care of autistic children with developmental regression (DR) is thwarted by the heterogeneous use of different terms, definition variation and inconsistent use of measurement tools. DR in children must be identified early to facilitate early intervention and opportunities for emerging novel therapeutics and lack of an agreed definition and methods to measure DR delays identification and impacts on data collection to report incidence and prevalence rates.

Inconsistent definitions and measurement tools cause confusion for parents, caregivers, researchers and clinicians alike.

Objectives:

To describe the definitions and measures used when studying loss of skills in autistic children.

Methods:

Scoping review of studies about autistic children with skill loss in ≥1 developmental domain. Participants were any child aged up to 18 years old with loss of skills in any of the following developmental domains; language, social, motor, cognitive and adaptive skills. Use of an operational definition (a clear concise definition) and use of, and types of measures used were extracted. Data checking was completed by at least 2 experienced researchers. An extensive search strategy of synonyms of DR in PubMed, Embase, Psychinfo, Cochrane systematic reviews identified over 16 000 studies. Descriptive analysis based on final 101 included full text studies using PRISMA.

Results:

Of 101 included studies 90% used an operational definition.

45% of studies used or referred to the Autism Diagnostic Interview-Revised (ADI-R) definition (Rutter, et al 2003).

A study specific definition was used in 45%, and 9% did not describe a definition.

The ADI-R was the most used measure. There were 45 different study specific measures used including study specific questionnaires, interviews and other methods including searching medical records and home-videos. Of the study specific measures only a minority used validated tools such as the Regression Validation Interview, or Regression Supplementation Form.

Conclusions:

Most studies involving autistic children with loss of developmental skills used an operational definition, however definitions were heterogeneous in age of onset, type, and duration of skills loss. Nearly half of definitions were unique and study-specific. While the ADI-R
is the most used measure it was used in less than half of the studies. 45 different study specific measures were used and a minority used published regression questionnaires or other objective measures.

Consistent terminology, an agreed operational definition, and standardised measurement methodology across research and clinical care for autistic children with loss of developmental skills is urgently needed.

Objectives: To establish the construct validity, consumer acceptability, and clinical utility of the INCAAF for young children with neurodevelopmental conditions (NDCs).

Methods: The INCAAF was evaluated across two pilots, with modifications to the tool in between. The INCAAF collects information through clinical interview, observations, standardised measures, file reviews, and contact with other professionals. The information is then used to score the items of the ICF Core Sets for NDCs. Items were scored according to the ICF scales, except for the environmental factor scale, which was modified from a facilitator to barrier scale into two separate scales.

For both pilots, the INCAAF was administered with children (n=18 and n=18) with, or suspected of, NDCs under the age of six years (5.1 (3.4-5.9) and 3.0 (1.7-4.9) years of age respectively) and their parents (n=20 and n=20) as part of a home assessment by an occupational therapist. Between 34% and 80% of each sample had or was being considered for a diagnosis of autism. After receiving the results of the assessment, caregivers were asked to provide feedback about the INCAAF’s acceptability through an interview or online survey.

Clinical utility workshops were held with clinicians (n= 30 and n=12 respectively) who assess functioning for children with NDCs. Workshop questions were guided by the Multi-dimensional Model of Clinical Utility (MDM CU; Smart, 2006), and workshops were recorded and transcribed. The transcriptions were then analysed using template analysis with the MDMCU providing priori themes.

Results:

Construct Validity: In both pilots, there were few significant and/or strong associations between facilitator and barrier scores, supporting the measurement of the environment across two separate scales. The interview and clinical observations were the most frequently utilised sources of information for scoring items.

Consumer Acceptability: Within the first pilot, caregivers found the INCAAF acceptable, and suggested ways to improve clarity. After the INCAAF was revised, caregivers in the second pilot reported that the INCAAF was easy to understand and that they would be very likely to recommend the INCAAF to a clinician.

Clinical Utility: Clinicians generally felt the INCAAF was well suited to assessing young children with NDCs in allied health and/or multidisciplinary contexts. Clinicians described the resources and training they would like available alongside the tool.

Conclusions: The INCAAF shows good construct validity, consumer acceptability and clinical utility in the Australian context. With further revision and testing, the INCAAF is expected to be a valuable tool for clinicians when assessing young children with, or suspected of, NDCs.
This study examines the characteristics and co-occurring diagnoses of autistic older adults (age 40 and older) in a national sample.

Objectives:

The study's objectives are to (1) describe clinical and demographic characteristics, (2) identify access to healthcare systems, and (3) examine how autistic adults utilize these resources.

Methods:

Data was collected through a national survey of autistic older adults aged 40 and older. The study employed a survey questionnaire to gather information on clinical characteristics, access to healthcare systems, and utilization of health services.

Results:

The survey data revealed several key findings. Firstly, the majority of participants reported consistent access to healthcare systems. However, there was a notable variation in the type and quality of care received, with some individuals facing challenges in accessing specialized supports.

Conclusions:

The study highlights the importance of tailored healthcare interventions for autistic older adults. It underscores the need for further research to better understand the unique needs and challenges faced by this population, as well as the development of effective strategies to improve access to healthcare services.

Background:

Autistic individuals often require specialized supports as they age, which can be challenging to access. This study aims to fill gaps in our understanding of the healthcare needs of autistic older adults, providing valuable insights for policymakers and healthcare providers.
Methods:

National (US) Medicaid and Medicare claims for 2014-2016 for all enrolled autistic individuals aged 40 and older were utilized. Diagnoses were identified using validated algorithms from the Chronic Condition Warehouse (CCW). Autistic individuals included mutually exclusive groups of individuals with and without co-occurring intellectual disability, n=37,330 (ASD/ID) and n=19,955 (ASD only) respectively. A comparison group of individuals with intellectual disability (ID only, n=418,359) was constructed. Period prevalence for each chronic condition and ranked comorbidity combinations were calculated across each group for the study duration.

Results:

Most individuals across all groups relied upon Medicaid (89.3%), frequently presented with co-occurring ID (65.2%), and a greater proportion was female (32.5%) when compared to previous younger, national samples or individuals with ID (47.6% female). A greater proportion of both ASD groups were under 65 (91.4% with ID and 83.7% without ID) than the proportion of the ID group (80.9%). Autistic older adults were slightly less diverse. In the ASD/ID group, 16.5% were Black and in ASD Only 10.5% were Black (ID only group was 17.2% Black). A greater proportion of the ASD Only (72.3%) and ID Only (71.0%) groups had comorbidities than the ASD/ID group had (61.2%), and almost triple the proportion of the ASD Only group had 5 or more comorbidities (15.9%) compared to the ASD/ID group (5.8%). The most frequent combinations of comorbidities across autistic older adults (with or without ID, in order) were hyperlipidemia/hypertension, diabetes/hypertension, depression/hypertension, and hypertension/kidney disease. Anemia was a common comorbidity, in combination with hypertension and hyperlipidemia. Among all Medicaid enrollees, hyperlipidemia/hypertension was also the most common comorbidity, but Alzheimer’s and dementia/hypertension, and anemia/hypertension occurred more often than in the ASD groups, followed by diabetes/hypertension. With recently acquired data through 2019, period prevalence across comorbidities and groups will be updated.

Conclusions: To our knowledge, linked data from Medicaid and Medicare has generated the largest, national samples to date of older autistic adults. The ASD Only group was more similar to the ID Only group than the ASD/ID group, suggesting complex healthcare needs and/or barriers to accessing needed services. Comorbidities differed among the ASD groups compared to other Medicaid enrollees, suggesting differences in health risk. Population-level data are a promising path for catalyzing research advancements, especially when paired with direct engagement of autistic older adults, their caregivers, and their care providers to capture preferences and lived experiences.

427.412 (Poster) Reproductive Health Outcomes Among Autistic Individuals
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Background:

Reproductive health is a key component of to preventing adverse health outcomes and promoting positive health outcomes across the lifespan. Few research studies have tackled this important topic among autistic individuals. Emerging research has identified that autistic adolescents may receive less sexual education than their peers. Cross-sectional data compared to national survey data found that autistic young adults had lower rates of sexually transmitted illnesses (STI) when compared to the general population. However, other research has identified that there may be elevated rates of health-related risky behaviors among adolescents and young adults on the autism spectrum. One study conducted in the Taiwan National Health Insurance Research Database (NHIRD) found an increased rate of STI than a comparison group. This study further identified that long-term use of antipsychotics was associated with a lower risk of STI compared with nonuse and recommended clinician monitoring of behaviors and risk. Examining these trends at the population level in additional countries is needed to determine how these differing observations of risk occur across nations. Information about incidence and prevalence can drive key system changes for healthcare and reproductive health access, as well as reproductive education. Recent advancements in the US healthcare system and specifically in Medicaid, the public health insurance program, have resulted in most states covering both HIV and STI counseling and screening without payment from Medicaid enrollees required.

Objectives:

This study seeks to examine the prevalence of STI and reproductive health outcomes and service use among autistic individuals.

Methods:

National (US) Medicaid claims for 2016 for all enrolled autistic individuals aged 14 to 50 and similarly aged cohorts of individuals with intellectual disability (ID) and a random sample of Medicaid enrollees were constructed. Diagnoses of autism and ID were identified using ICD-10 and validated algorithms from the Chronic Condition Warehouse (CCW) which have also be used in the majority of autism research to date. As a preliminary step to understanding STI among autistic individuals, we examined STI among autistic birthing people compared to their peers with ID, and a random sample of other Medicaid enrollees. Childbirth was identified using a standard protocol for
Assessing the Validity of a Risk Classification Given By an Autism e-Screener When Used By Medical Providers in a Clinical Setting

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Background: The rate at which children < 36 months are accurately and efficiently diagnosed with autism spectrum disorder (ASD) has continued to be an ongoing challenge. Because early identification of ASD accelerates access to support, providing efficient and easily accessible screening tools to medical providers has proved to be essential in a clinical field. We developed a novel application (“Paisley”)
that supports medical providers in identifying early and suspected signs of ASD in toddlers by providing risk classifications, and/or the likelihood that a child could have ASD.

Objectives:

To see if the risk classifications given by the Paisley application are supported by medical providers and their diagnostic decisions following administration.

Methods: Paisley is a tablet-based app that guides its’ users through nine play-based activities. This application was used in a clinical setting by a sample of medical providers (n = 42), specifically nurse practitioners and physician residents on rotation. After an approximately 15-minute administration, medical providers were immediately asked to answer questions based entirely on their own clinical judgments and behavioral observations from each unique session. Providers received no help or guidance when answering these questions. Each provider could administer Paisley to up to 5 children, with 115 children being included in analyses. Medical providers were also asked to give their diagnostic decision after reviewing the results from the application. Immediately following Paisley administration, children received a full diagnostic evaluation with a blinded psychological examiner.

Results: Of the 42 medical providers that used the application, and the 115 total sessions, only 7 session providers (6.09%) responded “No” when asked if they agreed with the application’s risk classification. 108 session providers (93.91%) answered “Yes,” stating that they did in-fact agree with the applications given risk classification. Due to the high agreement rate with the risk classification given by our application, Paisley has shown to have a positive impact on the users that have encountered it and utilized it in a clinical setting. Of the 115 sessions, there were only diagnostic disagreements between the medical provider and the final diagnosis given by the psychological examiner in 16 of the 115 total sessions (13.91%).

Conclusions: Medical providers that used Paisley were able to learn the application in a short time frame and administer nine newly learned play-based activities. After each session, the medical providers were instructed to answer questions based solely on their observations and clinical judgments alone. Findings show that the application is easily accessible and simple to use due to the lack of knowledge and information given to the medical providers prior to using it in a real-time setting. The audio, visual and text instructions are also an aid in using the tablet during the session and have helped to accurately identify ASD in toddlers. The risk classifications given have shown to have a positive agreement rate with the medical providers using it. Further findings support the usage of app-guided technology in a clinical setting, and the impactful ways in which an e-screener could identify possible signs of ASD in toddlers.

427.415 (Poster) Leadership Education in Neurodevelopmental Disorders (LEND) Trainees As Family Navigators
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Background:

Families of young children with ASD often struggle to access community care after a diagnosis (Harvey et al., 2022). Although partly due to a lack of available service providers, especially in rural and medically underserved regions (Antezana et al., 2017), difficulty accessing care may also be due to fractured care systems – the diagnosing provider, the early intervention system, primary care providers, disability advocacy groups – that exist side-by-side without communicating. To help bridge this gap, the Vanderbilt Consortium Leadership Education in Neurodevelopmental Disorders (LEND) program collaborates with the Tennessee Cares for ASD Navigation Network to provide its trainees with a hands-on care navigation practicum that connects families of newly diagnosed children to community resources. The goal of this project is to train the next generation of leaders in neurodevelopmental care in the importance of navigation for families. However, it was unknown at project initiation how it would impact trainee knowledge and competence.

Objectives:

To determine the effect of participation in a care navigation practicum on interprofessional trainees’ skill and comfort level in providing autism-related resources to families who have recently received a diagnosis of autism for a child.

Methods:

Trainees completed a didactic module on care navigation, attended a training session with a Tennessee Cares Lead Family Navigator, and reviewed commonly available recommended resources for families of children with ASD in Tennessee. At four points within the academic year (October, November, January, February), trainees were matched with families of newly diagnosed children. Trainees had up to three points of phone contact with each family, which included reviewing standardized resources and utilizing a note-taking framework for reporting back to the lead Family Navigation Team. Trainees’ skill and comfort level in speaking with families and providing resources
was measured via a three-question, 5-point Likert scale survey completed pre- and post-practicum. Qualitative responses were collected via the note-taking framework.

Results:

Eighteen LEND trainees representing ten professions participated in the Care Navigation Practicum in 2021-22 academic year; 13 completed the pre- and post-surveys. An exact sign test demonstrated trainees reported increased ability to find autism-related services for families \( p = .02 \); comfort in discussing autism and related services with families \( p = .02 \); and confidence in helping families access autism-related services \( p = 0.035 \). Qualitative responses collected on contact reports indicated trainees’ knowledge of and comfort with care navigation increased over the course of the practicum (see Table 1).

Conclusions:

This study demonstrates the feasibility of the LEND Trainees as Family Navigators Practicum as a framework not only to orient trainees to resources, but also increase their comfort levels in talking with families. Giving future providers structured exposure to navigating families through the post-diagnostic period may increase not only knowledge, but also compassion for families within the future health work force.

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**POSTER SESSION — COMBINED TOPICS**

**438 - Combined Topics IV**

**438.368 (Poster) Influence of Age and Gender on the Severity of Autism in Children: Truth or Myth?**

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Background: Severity in children with Autism Spectrum Disorder changes with age. Similarly, severity based on gender of children with autism has been explored and has been not found to be significant. In this study we have looked at the differences in severity of autism based on age and gender.

Objectives: Our objectives were to determine if severity differs in autism children based on gender and age. We also analysed post intervention scores of CARS and ABC to see if same is statistically significant based on age and gender.

Methods: In this retrospective analysis of children with autism presenting to a tertiary center in North India over 5 years, we collected the baseline demographic data, CARS (Childhood Autism Rating Scale), CBCL (Childhood Behavior Checklist) and ABC (Autism Behavior Checklist) scores.

Results:

A total of 2161 children were included in the study. Mean age was 5.58 years \( \pm 3.25 \) and ranged from 1-28 years. 859 children were >5 years and 1302 at the time of presentation to our centre were <5 years of age. 1828/2161 (84.6%) were males. Baseline CARS scores were mild-moderate in 1010 (46%) children and severe in 1151 (53%). Mean baseline CARS score of this cohort was 36.35\( \pm 5.6 \). Mean of CARS scores in <5 years was 36.1 \( \pm 5.6 \) and in >5 years was 36.73 \( \pm 5.7 \) and this difference in baseline CARS was significant \( p=0.01 \). Mean CARS value in males was 36.27\( \pm 5.63 \) and in females was 36.8\( \pm 5.81 \) and this difference wasn’t statistically significant \( p=0.11 \).

ABC scores were done in 2116 children at baseline. Mean ABC score for <5 years was 79.7\( \pm 17.9 \) and 81.5\( \pm 17.7 \) for >5 years and this difference at baseline was statistically significant \( p=0.02 \). The baseline ABC scores in males \( 80.6 \pm 17.8 \) and females \( 79.9 \pm 18.1 \) weren’t significant \( p=0.56 \).

CBCL scores at the baseline, 2088/2161 children (97%) were withdrawn, 599/2161 (28%) showed hyperactivity, 648/2161 children (30%) had inattention and 2120/2161 had PDD (98%).
Post intervention data of 1824 children was analysed with mean of follow-up of 13.5 months. Mean difference in CARS scores pre and post intervention was 2.51 ± 7.6 and this was statistically significant (p<0.01). This difference was statistically significant when >5 and < 5 years groups were separately analysed (p<0.00). Also the mean difference in CARS scores was statistically significant amongst males and females after intervention (p<0.01).

Conclusions:

Age has correlation with autism severity assessed on CARS and ABC while gender differences of severity aren’t significant between the males and females. Post intervention decline in severity was seen in all age groups and both genders.

438.369 (Poster) Multimodal Behaviour Analysis for Early Diagnosis of Autism in Children
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Background: Early detection of autism is crucial for deciding the appropriate educational and behavioural intervention at the most suitable time. The lack of biological markers, the complexity of the diagnostic procedure, dependence on behavioural observations and developmental history, and subjective diagnosis demand the introduction of assistive technologies in diagnosing autism in children. Recent research has shown increased interest in leveraging machine learning paradigms for identifying biological and behavioural markers to aid the early detection of autism.

Objectives: Previous research has shown that linguistic biomarkers have the potential to efficiently classify children with autism (CwA) from the typically developing (TD) population. Similarly, it has also been found in the literature that the CwA exhibits atypicalities in emotional perception and expression. Accordingly, in this work, we propose a framework for multi-modal behaviour analysis, specifically the speech and facial expression behaviour in children, to aid in the early diagnosis of autism.

Methods: For the speech analysis, we used the transcripts of ASD and TD children from the Eigsti, Nadig, and Flusberg dataset provided by Child Language Data Exchange System (CHILDES) databank(MacWhinney, 2000). This consists of dyadic interaction between the child and a conversation partner of 76 children (ASD-35, TD-41). We extracted semantic and pragmatic features of the child-partner interaction for the binary classification using a Support Vector Machine (SVM) to predict if the child has ASD or not. Further, we analysed the facial expressions exhibited by the children to identify their emotional state, which could be used to enable efficient interactions during the assessment sessions. Due to confidentiality and privacy concerns, the facial expression data for autistic children was not available. Hence, for our experiments, we used a lab-curated dataset collected from YouTube, consisting of facial emotion expressions (FER) of TD children of the age group 3-10 years under the six labels - happy, sad, anger, surprise, fear and neutral. For the emotion recognition from FER data, we employed a transfer learning-based approach for classifying the emotions from the facial expression data collected as images.

Results: With the SVM classifier, the model could predict the child’s state based on their speech behavioural profile with approximately 94% which is significantly higher than the chance accuracy of 50% for the binary classification. For the multiclass of facial emotion classification, we could learn the child’s emotional state with 45% accuracy, which is higher than the chance accuracy of 16.67%.

Conclusions: The results show that speech-based biomarkers supported by a machine-learning paradigm are ideal candidates for the automatic assessment of autism. Similarly, once validated against CwA, FER can also aid the diagnosis. The next step is to develop a system to evaluate the proof of concept by integrating the modules into an assessment system and conducting a pilot study with children with autism.

438.370 (Poster) Role of Gluten Free Casein Free Diet in Children with Autism Spectrum Disorders: A Randomised Controlled Trial
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Background: Although the cause of ASD is not well-known, pre-and postnatal damage, nutrition, genetic, environmental, and immunological factors are reported to play a role in its pathophysiology. Gluten-free casein-free diet (GFCF) is an elimination diet and is frequently administered in ASD. It is speculated to work through gut-brain theory and attenuation of the effect of peptides on neurochemical circuitry. Various studies have shown beneficial effects of GFCF diet on behavioral profile of children with ASD but sufficient evidence is still lacking.
Objectives: To evaluate the efficacy of add-on GFCF diet compared to standard treatment in improving the core symptoms of Autism Spectrum Disorder

Methods: Children aged 3-12 years fulfilling DSM V criteria for ASD with normal hearing and who were on standard treatment for <12 weeks were screened. This is a single-blind, randomized placebo-controlled trial. Control group constituted children with a similar profile who were on standard treatment. GFCF diet was given for 12 weeks after baseline laboratory investigations. Outcome was assessed on the basis of Childhood Autism Rating Scale (CARS) and Autism Behavior Checklist (ABC) at 24 weeks. fMRI Brain was done in a subset of children of both the groups (Dietary group:11; Control group: 6). This is an ongoing study with proposed sample size of 50 children in each group. We are presenting the interim analysis of our study results.

Results: Total of 33 children in each group were analysed, 45% were <5 years and 55% were ≥5 years of age; 86% males and 14% females. Two children in the diet group were anemic (Hb<10g%), rest laboratory parameters were within normal range. The average weight at baseline in the diet and control group was 20 kg (11-67.5) and 16 kg (10-40) respectively. At 24 weeks, average weight in diet and control group was 22.5 kg (14-67) and 17 kg (12-40) respectively, showing an average increase of 2.5 kg in the diet group. The baseline mean CARS and ABC in the diet group was 35.6(3.5) and 77.6(12.9) whereas in the control group it was 35.22(3.9) and 80.06(11.6) respectively. 39.3% (13/33) in the diet and 30.3% (10/33) children in the control group had severe autism (CARS≥37) at baseline. At 24 weeks, average improvement in CARS and ABC score in the diet group was 2.5 (0.5-11) and 8.5 (2-44); and in the control group was 0.5 (0-3) and 3(1-28) respectively; showing significance [P<0.01] in both the scores. All the children (100%) with severe autism were graded in mild-moderate range at 24 weeks follow up in the diet group. Complete remission (CARS=27) was seen in one child in the diet group. No side effects were seen on GFCF diet.

Conclusions: The study shows promising results of gluten and casein elimination from diet in children with ASD showing significant improvement in behavioural profile.

438.371 (Poster) Effects of Creative or General Movement Interventions on Fine-Motor, Gross-Motor, and Functional Skills of Children with ASD

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Background:

Recently, we reported that 87% of school-age children with Autism Spectrum Disorder (ASD) are at risk for motor coordination impairments (Bhat, 2020; Bhat et al., 2022). Our past studies showed that rhythmic movement and yoga-based interventions led to generalized and task-specific improvements in gross-motor performance (Srinivasan et al., 2015; Kaur et al., 2019).

Objectives:

The present study extends this work to compare the effects of a Creative Movement (CM) intervention combining music, dance, and yoga and a General Movement (GM) intervention using exercise and games (but no music and movement synchrony) to those of a standard-of-care, sedentary play (SP) intervention using building and art-craft, on the fine- and gross-motor coordination and functional endurance of children with ASD.

Methods:

45 children with ASD between 6 and 14 years participated in a pilot randomized controlled trial (RCT) over 10 weeks with pretests and posttests conducted during the first and tenth weeks. Children were matched on age, gender, and level of functioning and then randomly assigned to either CM, GM, or SP groups. Each child received 8 weeks of training @ 2 sessions/week. The CM group engaged in whole-body, music, dance, and yoga-based activities promoting interpersonal synchrony and multi-limb coordination skills. The GM group engaged in physical activities promoting upper/lower-limb strength and locomotor skills. The SP group engaged in tabletop activities such as reading, building, and arts-crafts to promote social interactions and fine motor skills. The Bruininks-Oseretsky Test of Motor Proficiency (BOT-2), the Test of Gross-motor development (TGMD), and the 2-minute-walk test were administered at pre- and post-tests. We also coded training-specific changes in motor coordination (unilateral, dual-limb, and multi-limb coordination) across early and late training sessions. We will also report baseline factors associated with/predictive of improvements in gross and fine motor skills post-intervention within each group.

Results:

Compared to the pretest, the CM and GM groups improved their BOT-2 body coordination (BC) and strength and agility (SA) composite scores following training (*ps < 0.05). In contrast, the SP group showed no improvements in their gross-motor composite scores (neither
Conclusions:

This study highlights the value of CM and GM interventions in promoting gross-motor coordination and endurance skills in children with ASD. Occupational therapists and physical therapists working with children with ASD can use CM and GM approaches to target their clients’ motor coordination and endurance skills. This work will provide support for the inclusion of whole-body movement experiences in the standard of care treatment for ASD.

438.372 (Poster) Effects of Creative or General Movement Interventions on Executive Functioning and Negative Behaviors of Children with Autism Spectrum Disorder (ASD)
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Background:

Children with Autism Spectrum Disorder (ASD) present with executive functioning (EF) challenges and also engage in repetitive behaviors. Repetitive behaviors such as sensori-motor stereotypies and negative behaviors (NBs) are known to be associated with children’s EF skills. Previous studies have reported positive effects of movement interventions on EF skills of individuals with and without ASD. In this pilot randomized controlled trial (RCT), we compared the effects of Creative Movement (CM, using music and synchronous movement), General Movement (GM, focusing on training strength and locomotor skills), and Sedentary Play (SP, standard-of-care training using building and art-craft activities) interventions on EF and NBs in children with ASD.

Objectives:

We compare the effects of CM, GM, and SP interventions on EF skills of children with ASD and investigate the relationships between EF skills and rates of NBs at baseline and post-intervention. We will also examine baseline factors associated with improvements in EF skills and NBs within each group following the training period.

Methods:

Forty-five children with ASD between 6 and 14 years were recruited and randomly assigned to the CM, GM, or SP groups. Children in all three groups received 16 training sessions (2 sessions/week), over 8 weeks. The CM group engaged in whole-body movements using music, dance, and yoga to promote interpersonal synchrony, imitation, coordination, and balance; the GM group engaged in physical activity that focused on upper/lower-limb strength and locomotor skills; the SP group engaged in tabletop activities such as reading, building, and art-craft to promote social interactions and fine-motor skills. Each child completed the Flanker task assessing inhibitory control (i.e., response accuracy and reaction time (RT) during congruent (CONG) and incongruent (INCONG) conditions) before and after the intervention. We also coded children’s rates of NBs during an early and a late training session. Within- and between-group t-tests were conducted to study intervention effects on EF and NBs. Exploratory correlational & regression analyses will be conducted to identify baseline factors (e.g., adaptive functioning, autism severity levels, motor performance) predictive of training-related improvements.

Results:

Children with better EF (i.e., shorter RT) at baseline had fewer NBs during training (RT during CONG: r = 0.43, RT during INCONG: r = 0.30). Both movement groups (CM and GM) showed training-related improvements in EF and were pooled for further analyses. Movement groups showed similar response accuracy but reduced RT during CONG and INCONG conditions post-intervention (*ps < 0.05), with no such improvements in the SP group (p > 0.05). Intervention-related reduction in RT was greater in the movement groups compared to the SP group (*ps< 0.05). Further correlational/regression analyses to identify factors predictive of training-related improvements are presently underway.

Conclusions:
Our findings replicate past research in this area and support the use of movement interventions (CM or GM) to promote EF skills and regulate NBs among children with ASD. Clinicians should consider adding whole-body movement interventions to the standard-of-care treatment for children with ASD.

438.373 (Poster) Mate Selection for Quantitative Autistic Traits and Implications for Current Trends in the Prevalence of Autism

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Background: Autism spectrum disorder (ASD) prevalence has continued to rise in the US over several decades (Maenner et al., 2021), including among minority Hispanic children, for whom prevalence is now starting to outpace that of the non-Hispanic white (NHW) population (Shaw et al., 2021). These trends pose the question of whether enhanced awareness and broadened diagnostic criteria fully account for this ongoing increase. Mate selection based on inheritable trait similarity is one factor that can increase the proportion of offspring with traits at higher and lower phenotypic extremes. While ASD is a categorical diagnosis, subthreshold quantitative autistic traits (QATs) exist in a continuum across the general population, are highly inheritable, and share genetic factors with ASD diagnosis. Assortative mating based on QATs, manifested by higher-than-expected spousal QAT correlations, has been repeatedly documented in prior general population cohorts and in parents of children with ASD, where spousal QAT intraclass correlations (ICC) have been on the order of 0.39 (Constantino et al., 2005; Virkud et al., 2009), with the highest ICC (ICC=0.60) observed in a sample of Hispanic spousal pairs of children with ASD (Page et al., 2016). Further, in a separate large epidemiologic cohort, parental pairings in the upper quintile for QATs were associated with twice the rate of ASD among offspring (Lyall et al., 2014), supporting an association between assortative mating and clinically significant aggregation of inherited ASD liability in offspring.

Objectives: To leverage two contemporary, simultaneously-ascertained epidemiologic cohorts of parents in Missouri and California to provide updated information on the degree to which spousal pairs exhibit correlations in autism-related trait variation in Hispanic (California) and non-Hispanic (Missouri) US populations.

Methods: QAT data on parents of epidemiologically ascertained toddler twins were collected as part of the Early Reciprocal Social Behavior Study (HD068479) in Missouri and California. Birth records identified all twin pairs born between 2011-2013 in these states. Parents were randomly selected for recruitment from pools of self-identified English-speaking Hispanic families in California and NHW families in Missouri. Parental QATs were measured using the Social Responsiveness Scale-2 (SRS-2), with mothers reporting on fathers and fathers reporting on mothers. ICCs quantified the strength of QAT relationships between spousal pairs.

Results: Ninety-five Missouri spousal pairs and 93 California spousal pairs completed the cross-informant-report SRS-2. There were no documented demographic differences in parents across states except for higher maternal education in the Missouri cohort. Mean SRS-2 scores did not significantly differ between California and Missouri mothers (CA=28.7 (17.1), MO=25.7 (18.5), p=.25), while California fathers showed significantly increased mean SRS-2 scores, signifying higher QATs compared to Missouri fathers (CA=26.6 (18.4), MO=19.6 (15.6), p=.005). ICCs for QATs were equal to 0.43 and 0.44 among spousal pairs in California and Missouri, respectively (see scatterplot in Figure 1).

Conclusions: These data provide strong confirmatory evidence of the persistence of mate selection for QATs in two contemporary, epidemiologically-sampled US subpopulations. Overall, findings suggest that quantifying and tracking spousal correlations across time may capture important underlying features of transgenerational mechanisms contributing to changes in ASD prevalence.

438.374 (Poster) Relationships of Joint Attention to Cognitive and Adaptive Functioning Scores in African American Toddlers with ASD

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Background: Epidemiological studies have highlighted disparities in clinical care for autism spectrum disorder (ASD) among Non-Hispanic black children, with findings including delays in identification and services, as well as twice the likelihood of comorbid intellectual disability (ID) versus Non-Hispanic white children (Constantino et al., 2020; Maner et al., 2021). Characterizing associations between early-emerging aspects of core ASD features and cognition as well as adaptive function could inform assessment and treatment planning in this underserved population. Joint attention (JA), the coordination of attention between individuals, represents a compelling candidate to explore, given its role in social communication and previously documented relationships with cognition and adaptive function (Klin et al., 2002; Mundy et al., 2017).

Objectives: To examine the relationship of joint attention to cognitive and adaptive functioning scores in African American (AA) toddlers with ASD.
Results: Baseline JA impairment was inversely correlated with VABS-3 ABC (r_{baseline} = -.51, r_{follow-up} = -.43, p < .001) and MSEL ELC (r_{baseline} = -.48, r_{follow-up} = -.43, p < .001). Regression models (Table 2) showed that JA scores contributed 19% of the variance to concurrent MSEL ELC cognitive scores when accounting for ASD severity and 3% of VABS-3 ABC when accounting for ASD severity and cognition. Baseline JA contributed 12.2% of the variance in follow-up MSEL ELC when accounting for ASD severity. While baseline JA accounted for 12.3% of variance in follow-up VABS-3 ABC as a sole predictor, the relationship was not significant after accounting for ASD severity and cognition.

Conclusions: Joint attention showed specific relationships, over and above ASD severity, to concurrent cognition and adaptive function at baseline, as well as cognition at follow-up. These findings suggest that further delineation of the relationships between core features of ASD and cognitive outcomes during toddlerhood, a high-impact period for intervention, could enhance identification of actionable assessment and intervention targets and address disparities in clinical management of ASD and associated comorbidity in the AA population.

438.375 (Poster) “It’s Definitely Better Than Not Having Anything”: Autistic Children’s Lived Experiences with Online and in-Person Delivery of Kontakt® Social Skills Group during the COVID-19 Global Pandemic

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Background: While internationally, there is interest in the potential benefits of delivering interventions via online platforms, telehealth is particularly relevant in Australia, where great distances impact access to services for more than a quarter of the population. The onset of the COVID-19 pandemic further heightened interest in these approaches. While emerging evidence suggests that online interventions for autistic children are equivalent to or even better than in-person services, research findings have been obtained predominantly from programs delivered to caregivers, parent-child dyads, teachers or care staff. Further, the few studies exploring the effect of online interventions for autistic children have been short (with sessions lasting for 10 minutes) and delivered to small groups of 2-3 children supervised by a parent. The present study emerged from a feasibility evaluation of the manualised 16-session KONTAKT®, a social skills group program (SSGP) developed for in-person delivery to autistic children aged 8 to 12 years. The onset of the COVID-19 lockdown coincided with the seventh session of KONTAKT®, necessitating that the final 9 sessions be delivered online, providing a unique opportunity to examine autistic children, their parents and the group trainers’ experiences and preferences when attending an SSGP.

Objectives: This study aimed to understand the lived experiences of autistic children, their parents and KONTAKT® trainers with the content and delivery mode of the program.

Methods: This focus group study was conducted with nine autistic children aged 8 to 12 years (M=10.87, SD=1.04; 67% male) participating in sixteen 60-minute KONTAKT® sessions, their parents and KONTAKT®. In response to the onset of COVID, the research teams adapted the program to online delivery. Children were advised to attend the sessions (delivered via Zoom) in a distraction-free space while wearing headphones for confidentiality purposes. After completing KONTAKT®, stakeholders’ experiences were collected via focus group, and data were analysed using thematic analysis.

Results: Thematic analysis findings revealed that regardless of the delivery format, participants were satisfied with KONTAKT®, expressing that “We had a lot of fun, especially when we all got to be there”, comparing their group members to “a family that doesn’t fight.” Four themes emerged from this study. Experience with the Structure and Content of the program, including recommendations on how KONTAKT® could be further modified to meet the participants’ needs. Group Context informed the stakeholders’ opinions about how COVID-19, trainer’s flexibility and having autistic peers as groupmates had affected their perception of the program. Online Delivery

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Conclusions: Findings indicated that regardless of stakeholders’ satisfaction with the SSGP, the in-person delivery is still perceived as more acceptable and beneficial. Future research would benefit from a child-centric randomised controlled trial comparing the two delivery formats, providing evidence for the efficacy of the telehealth-delivered interventions for autistic children.

438.376 (Poster) ‘I Had a Dream ...’ Coproducing and Re-Imagining Shakespeare’s Midsummer Night Dream from a Neurodiverse Perspective

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Background: While there is a large body of evidence examining the efficacy of social skills programs employing explicit strategies in teaching social skills to autistic youth in clinical settings, a more limited body of research has examined the role of implicit programs employing theatre in community-based settings. These approaches also align with the neurodiversity paradigm which has been a catalyst in shifting the focus of autism research from a deficit-focused model to a strength-based one. The neurodiversity paradigm highlights the importance of empowering autistic individuals by incorporating their views and values in support programs and interventions. Theatre-based programs (TBP) are social group programs delivered in an informal, community setting utilising implicit teaching strategies such as role-playing a character from a play and improvisational games. These programs aim to improve social skills through providing opportunities for socialising, shared learning, and opportunities for building social confidence through performing.

Objectives: This realist evaluation study aimed to identify the active ingredients (context, mechanisms, and outcomes) of TBP, ‘Reimagining Shakespeare’s Midsummer Night’s Dream’.

Methods: Participants were recruited for this realist evaluation using convenience sampling. Seven autistic adults aged between 17 to 49 years (M = 28 years, SD = 10.9; 71% female) participated in the 24-session TBP. Three facilitators delivered the program through three phases: theatre games (ten 2-hour sessions), scriptwriting (ten 5.5-hours sessions) and four 8-hour acting and stage production rehearsal sessions. The program culminated in a community performance of a reimagined ‘Midsummer Night’s Dream’ from a neurodiverse perspective. Three facilitators lead and supported the sessions. Data was obtained through participant observations and separate interviews at the end of each phase with autistic youth and facilitators. The semi-structured audio-recorded interviews were conducted online (via google meet). The recordings were then transcribed verbatim and analysed in NVivo following the realist evaluation approach (context-mechanism-outcome framework).

Results: Findings revealed six themes relating to the context (attitudes towards neurodivergence, context, facilitators, familiarity within the group, perceptions of Shakespeare’s work, previous experience with art), nine relating to the mechanisms (acceptance of neurodiversity, accommodating for disability, group dynamics, having a choice, predefined roles, passions and interests, seeking and receiving support, sharing ideas and sharing interests), and six relating to the outcomes (creation of an inclusive play from a neurodiverse perspective, increased skills and learning new ones, interest in future drama programs, making new friends, sense of achievement, sense of belonging) of the program.

Conclusions: Findings of the current study highlighted the importance of understanding the mechanisms that influence the outcomes for autistic individuals when attending a TBP. Notably, the results also contributed to defining a strength-based approach for coproducing a TBP, adding to the current body of knowledge. This study also highlighted the utility of plays, and specifically Shakespeare, as a platform supporting autistic youth in developing their social skills in a fun, community-based and age-appropriate setting. Future research would benefit from assessing the efficacy of such programs via randomised control trials.

438.377 (Poster) Objective Measurement of Inclusive Preschool Classroom Social Networks: Effects of Sex and Developmental Delays and Disabilities

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Background: Developmental disabilities/delays (DD), particularly autism spectrum disorder (ASD), are often characterized by deficits in communication and interaction, and are more prevalent in boys than girls. Much previous research on DD, including research on real-world contexts like preschool classrooms, has focused on boys and not addressed how girls and boys with DD may differ in their interactions with
peers. Overall, children’s language abilities are positively associated with their centrality to peer networks; however, it remains unknown if this is equally important for boys and girls with and without DD.

Objectives: Use automated measures to create preschool social networks and objectively measure how girls and boys with DD differ from each other and their typically developing (TD) peers in their social interactions. We also explore the extent to which language abilities are predictive of the social interactions of girls and boys with and without DD.

Methods: Participants included 77 children (DD=47 [ASD (5 girls, 19 boys) grouped with developmental delay (7 girls, 16 boys)] and TD=30 [20 girls, 10 boys]). During monthly observations, children wore vests equipped with LENA recorders to measure vocalizations and two Ubisense tags to measure location/orientation. Ubisense measures of proximity/orientation were used to determine social contact, and synchronized to LENA data to assess each child’s social language output to peers and input from peers. Children’s language abilities were assessed by the Preschool Language Scales (PLS-5). Data were aggregated to create classroom social networks based on the frequency of dyadic language-mediated interactions (Figure 1). Social network analysis yielded measures of modularity, or cohesiveness of groups (i.e., DD/TD) within the class, and each child’s degree centrality, or the social ties children have to their peers based on their rate of co-talk, which is the sum of the rates of language input from and output to peers (in hours). We also assessed how children’s PLS-5 scores were associated with their interactions and role in the classroom network.

Results: Data have been collected for an additional 52 participants (DD=39 [ASD (3 girls, 8 boys), developmental delay (17 girls, 11 boys)] and TD=13 [7 girls, 6 boys]) to be included in final analyses. Preliminary findings indicated the TD group had higher modularity than the DD group (p=.049). Follow-up pairwise comparisons revealed TD girls had the highest within-group modularity, which was significantly higher than DD boys’ modularity (p<.02). TD children were more central to classroom networks than children with DD (p=.01), indicating that TD children produced more vocal output and received more input from peers than children with DD, but there was no significant interaction between sex and group. However, there was a significant interaction between TD boys and PLS-5 scores (p=.01) in predicting centrality, suggesting that language abilities may be an especially important factor in supporting co-talk for boys (Figure 2).

Conclusions: Objective measurement provides a clearer understanding of children’s vocal interactions, indicating that both group and sex are crucial components of classroom network formation. These findings suggest that sex is a crucial factor in designing and implementing interventions in inclusion classrooms.

**438.378 (Poster) Objective Measurement of Social Approach: A Scaffold for Intervention in Inclusion Classrooms**

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Background: After 3 years of age, inclusion classrooms, in which children with developmental disabilities (DD) are educated alongside typically developing (TD) children, are a best practice intervention context for children with disabilities, particularly children with autism spectrum disorder (ASD). Children with ASD have lower quality social interaction than their typically developing peers (Lord & Magill-Evans, 1995). Although teachers play an important role in facilitating evidence-based practices to support peer interactions, social interactions between children with ASD and their TD peers may be more likely to take place in the absence of adults (Hume et al., 2019). Physical movement supports social interaction in the classroom, which is frequently facilitated when partners and in proximity to one another. Yet we have little objective data on how children with ASD approach and are approached by their teachers and peers.

Objectives: Utilize automated measurements of velocity to quantify child-teacher social approach and peer-peer social approach in children with ASD, DD, and TD.

Methods: 77 children (M=48.26 months, SD=7.47), including 24 children with ASD, 23 children with DD (unspecified), and 30 TD children, and 12 teachers were observed in 8 inclusion preschool classrooms. All classrooms contained TD children and children with ASD. Four classrooms contained children with DD. Children were observed on 3.52 mean occasions (SD=1.32) for a mean duration of 138.2 minutes per occasion (SD=63.6). Objective measurements of position and orientation were collected using ultra-wide radio frequency identification (Ubisense) sensors, which tracked a right and left tag worn by each individual in a specially-designed vest (a fanny pack for teachers). Social approach was measured continuously as the distance each individual moved toward the initial position of each partner, weighted by distance, orientation, and angle of movement. Higher weight was given to more direct approaches occurring over closer distances.

Results: Children with ASD (p < 0.001) approached teachers at higher velocities than their TD peers, and were approached by teachers at higher velocities than their TD peers (p < 0.001, see Figure 1). Children with DD did not approach their teachers at higher velocities than their TD peers (p = 0.057), nor were they approached by their teachers at higher velocities to their TD peers (p = 0.125). Within peers, children with ASD (p = 0.063) and DD (p = 0.609) did not differ from TD children in the velocity with which they approached other children (see Figure 2). However, children with ASD (p = 0.001) were approached by other children at lower velocities than TD children.
Conclusions: Multi-hour, objective measurements in preschool inclusion classrooms indicated that children with ASD approached their teachers and were approached by their teachers more quickly than DD and TD children. This suggests that children with ASD require and receive more interaction from their teachers than TD children. By contrast, children with ASD were slower to be approached by other children, suggesting a deficit in peer interaction. The results suggest the need for interventions in inclusion classrooms that target the peer interactions of children with ASD.

**Communication and Language**

### PANEL DISCUSSION — COMMUNICATION AND LANGUAGE

#### 211 - Multisensory Perception in Autism: Crucial to Language, Promising for Improvement

**Panel Chair:** Robert Jertberg, Vrije Universiteit Amsterdam, Amsterdam, Netherlands

Integrating information from different sensory modalities allows the brain to make sense of a constant barrage of diverse inputs by recognizing similarities across domains. This is essential to basic perceptual processes like detection and recognition of stimuli, but also to more complex features like speech. Mounting evidence linking impairment in multisensory integration (MSI) to language deficits in children with autism spectrum disorders (ASD) highlights it as a potential target for interventions meant to ameliorate the associated communicative and social issues. Promisingly, our research falls in line with a burgeoning body of evidence suggesting that the impoverished MSI seen in children with autism may be resolved by adulthood. This discussion will synthesize findings from psychology and neuroscience underlining the importance of MSI to speech and the promise it holds for improvement in ASD. It will also emphasize the significance of studying ASD in adults as well as children so as to understand how symptoms develop over time and identify propitious targets for interventions. Given the profound and pervasive deleterious effects of language deficits, and the room for growth in MSI, it is a prime candidate, and early interventions that expedite the process could provide cascading positive effects for individuals with autism.

#### 211.001 (Panel Discussion) Behavioral and Neural Indices of Multisensory Processing in Autism: A Developmental Perspective

*S. Molholm* and *J. J. Foxe*, (1)99 Reade St., Bronx, NY, (2)The Ernest J. Del Monte Institute for Neuroscience, University of Rochester Medical Center, Rochester, NY

**Background:** Redundant and complementary multisensory cues are well-known to enhance perception, improving processes such as object detection, localization, and identification. There is significant empirical support that multisensory processing is reduced in children with autism. However, evidence for impaired multisensory processing in autistic adults is less compelling. This suggests that multisensory processing “improves” over the course of development in autism.

**Objectives:** Here we sought to characterize the developmental course of multisensory processing in autism.

**Methods:** Using a cross-sectional approach, we characterized multisensory processing in children and adults (N=364) with and without a diagnosis of autism. Reaction times and electrophysiological (EEG) data were recorded while participants performed a simple reaction time task in response to auditory, visual, and audio-visual stimuli.

**Results:** Using simple, non-social audiovisual stimuli we found that deficits in multisensory processing were observed in high-functioning autistic children and teenagers but not in adults with the condition. Computational modelling was consistent with multisensory processing transitioning from a default state of competition to one of facilitation, over the typical course of development, and a delay in this transition in autism.

**Conclusions:** Impaired multisensory processing in autistic children but not autistic adults suggests that there may be a recovery of multisensory function in autism over the course of development. We consider the need to develop effective interventions so that this “recovery” can be shifted earlier in the developmental trajectory, such that multisensory functions are available at developmentally appropriate stages of development (e.g., for various language and communication competencies), to facilitate the emergence of functions typically impaired in this population.

#### 211.002 (Panel Discussion) The Special Role of Multisensory Integration in Speech Perception in Autism

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**Background:** In face-to-face communication, such as simple conversations, we perceive what speakers are saying not only through our auditory (hearing) but also our visual (seeing) system. Seeing a speaker's facial movements can increase our understanding substantially, especially in noisy conditions, and is vital in understanding speaker intentions, emotions and motivations. This “multisensory
enhancement” is an important aspect of social communication and we have shown that this ability is greatly impaired in individuals on the autism spectrum (Foxe, et al., 2015). Interestingly, we also found that this deficit ameliorates over time which indicates that it can be subject to therapeutic intervention.

Objectives: One important question that arises from these findings is what part of the network of brain regions involved in multisensory speech perception gives rise to this deficit. Is there impairment in regions known to integrate sounds and visual signals such as the posterior superior temporal sulcus (pSTS) or at other, perhaps earlier stages in the visual system such as areas that process natural (biological) motion? To answer these questions, we needed to understand the network of brain regions involved in multisensory speech perception first.

Methods: For this, using functional magnetic resonance imaging (fMRI) we recorded brain activity from a sample of 53 neurotypical adults while observing a recording of an actress telling the story “The Lorax” by Dr. Seuss. The story was presented in auditory only (no facial articulation), visual only (no sound) and audiovisual (both sound and facial articulation) conditions. We compared the resulting brain activity between our multisensory and unisensory conditions to identify brain regions showing multisensory gain where brain activity to the multisensory condition was larger than in both unisensory conditions.

Results: We found multisensory enhancement in brain regions associated with speech and language perception, multisensory integration (pSTS), emotion (amygdala) and along the early sensory pathways in the thalamus (Ross et al., 2022). This network was considerably more extensive than previously shown. We conducted the same study in children and teenagers with ASD and compared them to a TD sample of the same age. Both groups showed largely similar brain responses to the unisensory and multisensory presentations of the story. However, when comparing the magnitude of multisensory enhancement, we found that ASD children showed significantly less pronounced enhancement than their neurotypical peers. These differences were located in brain regions associated with multisensory integration and semantic processing. We also compared a group of adults on the Autism Spectrum with a neurotypical control sample. We found that the differences between groups were not as pronounced in adults as in our young samples and were located in similar regions. These findings suggest that multisensory enhancement in brain activity as measured by fMRI might change over age in Autism Spectrum Disorder mirroring our previous behavioral findings. This development unfolds in regions along the superior temporal sulcus that are well known to be associated with multisensory integration and semantic processing.

Conclusions: Multisensory speech integration processes may be a major contributor to social communication deficits in multi-speaker and noisy environments in ASD.

211.003 (Panel Discussion) Temporal Dynamics of the McGurk/Macdonald Effect in Adults with and without Autism

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Background:

In autism spectrum disorders (ASD), impairments of both temporal processing and multisensory integration (MSI) have been thoroughly established among children, and are thought to be crucial to broader symptomatology, particularly with regard to speech processing. At the intersection of MSI and speech perception lies the McGurk effect, wherein presentation of incongruent phonemes and visemes leads to an illusory percept that lies somewhere in between them. This is considered a hallmark of MSI, and is indeed found significantly less often in children with autism. However, McGurk findings with adult ASD samples are quite mixed, and often suffer from poorly controlled methodology and small sample sizes. Additionally, the role of temporal dynamics in governing the effect, and how their influence might differ between adults with and without autism, is poorly understood, and could speak to the nature of multisensory temporal processing in ASD.

Objectives:

To address these shortcomings, we have recruited the largest sample to date of autistic adults and neurotypical controls, and provided a uniquely controlled version of the McGurk task, with the goal of determining whether the differences seen in children in both the propensity to integrate auditory and visual speech stimuli and precision of temporal processing persist into adulthood.

Methods:

Autistic and neurotypical participants (numbering over 300) were both presented with videos and corresponding audio of congruent (ga/ga) or incongruent (ba/ga) phonemes and visemes. Stimulus onset asynchrony of the stimuli was manipulated so that the audio was either simultaneous with the video, or led/followed it by 250 or 500 milliseconds. Participants were asked first to respond to whether they heard a ga, ba or da (McGurk fusion) pronounced, and then to make a simultaneity judgment on whether the video and audio were synchronized.

Results:
The reduced susceptibility to the McGurk effect and impairments in temporal processing found in children with autism were not replicated with our large sample of adults. Additionally, in a novel finding, for both autistic and neurotypical participants, the incongruence of the audio/visual streams led to a profound interference in simultaneity judgments, one that applied even when the illusion was perceived.

Conclusions:

Our findings resonate with the burgeoning body of research suggesting that the MSI deficits evident in children with autism are resolved by adulthood. This is very promising, as it suggests that a key deficit associated with speech perception and the related social factors may be subject to an improvement that might be facilitated via early interventions. Additionally, our novel findings with regard to the manner in which incongruence between audio and visual streams can produce a massive interference in simultaneity judgments (and the illusion can occur despite recognition of asynchrony) challenge the notion that perceived synchrony of the sensory streams is an immutable foundation upon which their interactions are built. Together, these findings have profound implications both clinically, in terms of our understanding of the development of MSI in ASD, and theoretically, in terms of our understanding of the reciprocal relationship between temporal processing and MSI.

211.004  (Panel Discussion) No Differences between Adults with and without Autism in Audiovisual Synchrony Perception
E. van der Burg, R. F. Weiland, T. J. Polderman, D. Smit and S. Begeer, (1) Universiteit van Amsterdam, Amsterdam, Netherlands, (2) Vrije Universiteit, Amsterdam, Netherlands, (3) Clinical Developmental Psychology, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, (4) Amsterdam Medical Centre, Amsterdam, Netherlands, (5) Clinical Developmental Psychology, Amsterdam, Netherlands

Background: To facilitate multisensory processing, the brain binds multisensory information when presented within a certain maximum time lag (temporal binding window). In addition, and in audiovisual perception specifically, the brain adapts rapidly to asynchronies within a single trial and shifts the point of subjective simultaneity. Both processes, temporal binding and rapid recalibration, have been found to be altered in individuals with an autism spectrum disorder diagnosis.

Objectives: Here, we used a large adult sample (autism spectrum disorder: n = 75, no autism spectrum disorder: n = 85) to replicate these earlier findings.

Methods: In this study, audiovisual stimuli were presented in a random order across a range of stimulus onset asynchronies, and participants indicated whether they were perceived simultaneously. Based on the synchrony distribution, their individual temporal binding window and point of subjective simultaneity were calculated.

Results: Contrary to previous findings, we found that the temporal binding window was not significantly different between both groups. Rapid recalibration was observed for both groups but did not differ significantly between groups. Evidence of an age effect was found which might explain discrepancies to previous studies. In addition, neither temporal binding window nor rapid recalibration was correlated with self-reported autistic symptoms or sensory sensitivity.

Conclusions: We did find that both processes develop over age, and since previous studies tested only young people (children, adolescents, and young adults), and we tested adults from 18 to 55 years, this might explain the different findings.

ORAL SESSION — COMMUNICATION AND LANGUAGE
315 - From Preverbal to Bilingual: Exploring Language Heterogeneity

Moderator: Rhiannon Luyster, Communication Sciences and Disorders, Emerson College, Boston, MA

315.001  (Oral) Highlighting the Importance of Early (pre)Verbal Productions: Language Outcomes of Young Autistic Children
P. Maes, B. Busson and M. Kissine, ACTE — Center of research in Linguistics — ULB Neuroscience, Université libre de Bruxelles, Brussels, Belgium

Background: Studies on predictors of language outcomes in autism usually assess the effects of child characteristics (e.g., cognitive abilities, receptive and expressive language, autism severity) obtained from standardized assessments on subsequent development of verbal skills. However, these traditional predictors may overshadow a lot of variability, especially because of floor effects in children who are minimally verbal at the time of assessment. In a previous study (Maes et al., 2022), 3- to 5-year-old autistic children’s language abilities were described based on their vocal and verbal production during un- and semi-structured adult-child interactions. Using cluster analysis, each preschooler was assigned to one of five subgroups with qualitatively different patterns of vocal production. Based on these patterns of vocal productions, two clusters were identified as being composed of verbal children and the remaining three of minimally verbal children.
Nonverbal Communication Experiences of Autistic Adults: A Qualitative Analysis of Online Discussion Forums

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Background: Atypical nonverbal communication is required for a diagnosis of autism at any age (APA, 2013), yet very little is known about how autistic adults use gestures, facial expressions, and other nonverbal behaviours in social interactions (de Marchena et al., 2019; Georgescu et al., 2020). Even less is known about autistic adults’ experiences of using nonverbal communication in interactions; qualitative studies suggest that both internal and external factors affect autistic adults’ communication experiences across contexts (Cummins, Pellicano, & Crane, 2020; Nicolaidis et al., 2015).

Objectives: The objectives of this study were: (1) to understand autistic adults’ experiences of using nonverbal communication in interactions, (2) to understand how nonverbal communication impacts autistic people’s lives, and (3) to understand how autistic adults manage nonverbal communication differences.

Methods: 27 threads from the internet discussion forum wrongplanet.net, all containing dialogue focused on nonverbal communication, were subjected to qualitative analysis. Inductive and deductive coding were used to identify excerpts relevant to miscommunication experiences, communication strengths, and compensatory strategies (Braun & Clarke, 2006). A total of 362 excerpts were coded (kappa = .79). Coded excerpts were then extracted and examined for themes, using member checking.

Results: Major themes included: (1) Cognitive differences resulting in autistic adults requiring more time and energy to manage nonverbal communication in interactions; (2) Miscommunication related to nonverbal communication is mutual; (3) Nonverbal communication differences can negatively impact the lives and wellbeing of autistic adults; and (4) Skills and strategies used by autistic adults to manage nonverbal communication. See Table 1 for illustrative quotations. Some respondents reported avoiding nonverbal communication in favour of preferred, more direct communication strategies such as writing. Many autistic respondents described internalising blame for both miscommunications and negative judgements from others, despite the bilateral nature of communication.

Conclusions: Findings support the ‘double empathy problem’ model that communication breakdowns occur between autistic and non-autistic people yet predominantly impact autistic people (Milton, 2012), applying it to nonverbal communication. Several of our themes, including mutual miscommunication and negative impacts of atypical communication, are consistent with previous qualitative work on communication experiences of autistic adults. The current findings provide new insight into the internal and external factors influencing the nonverbal communication experiences of autistic adults, in particular the cognitive processes involved. We advocate for solutions that shift the responsibility for effective communication onto all members of society, instead of trying to ‘fix’ the autistic person. For example, sharing and accepting preferred communication modalities, and checking in about whether a message was received correctly instead of making assumptions, are two strategies endorsed by respondents.
Investigating the Abandoned End of the Spectrum: Clinical Features of Non-Verbal and Minimally-Verbal Children on the Autism Spectrum

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Background: Despite the increased interest in autism spectrum disorder (ASD) research over the past three decades, limited research about non-verbal (NV) and minimally verbal (MV) children with ASD is available. We previously determined that nearly 1 in 5 children with autism lacked spontaneous and functional language by age 8 years, a significant minority despite early intervention. Due to the pervasive challenges that NV/MV children will face, understanding this population is of particular importance. That said, this is the first population-based study in a large, diverse US metropolitan area to examine the differences in clinical features and ASD-related factors between NV/MV and verbal children with ASD.

Objectives: The main objective of this population-based study was to detect any potential risk factors, and/or behavioral outcomes linked to verbal inability. Clinical factors, such as intellectual ability and ASD impairments, as well as ASD-associated factors, such as aggression, self-injurious behaviors (SIBs), temper tantrums, and low frustration threshold, were included in analyses to examine variation based on these factors.

Methods:

Data were collected from an active ASD surveillance in 2016 representing children born in 2008 and residing in NJ in 2016. Retrospective information on clinical features and verbal ability was collected for each child from medical and special education records.

Verbal ability at or after age 48-months was defined by the following case definitions: verbal, the child can answer and speak in sentences; minimally verbal, the child can speak in 1 and/or 2-word phrases, and non-verbal, the child can produce sounds but not intelligible words.

Pearson Chi-square was used to compare differences between verbal and NV/MV cases. Data was further stratified by clinical factors and ASD-associated features.

Results:

Overall, we identified 188 out of 1055 ASD children as NV/MV (prevalence: 5.7 per 1,000). Of the NV/MV children, 67.6% (n=127) had co-occurring intellectual disability compared to 17.1% (n=139) of verbal ASD children (p<0.0001). Among NV/MV children, 20.21% had mild ASD severity, 40.96% had moderate ASD severity, and 38.83% had severe ASD severity. Among verbal children, 52.65% had mild ASD severity, 31.32% had moderate ASD severity, and 16.03% had severe ASD severity (p<0.0001). NV/MV children were more likely to experience regression in their early developmental milestones than verbal children (22.3% vs 12.3%; p<0.0004).

Overall, NV/MV children had lower frequencies of temper tantrums 53.7% (n=101) and mood abnormalities 66.5% (n=125) compared to verbal children, 61.5% (n=499) and 78.3% (n=635), respectively. Additionally, we found no differences between NV/MV and verbal children when assessing self-injurious behavior and aggression.

Conclusions: NV/MV children with ASD were demonstrated to have a higher degree of ASD severity and intellectual disability than verbal children with autism. This information may be utilized by clinicians to screen and connect children on the spectrum presenting with early language deficits to preventive behavioral and psychological services. Further research from population-based studies with large sample sizes is warranted to understand the risk factors for NV/MV children and develop strategies for interventions as well as addressing health disparities.

Discrepancies in Receptive and Expressive Language Profiles in Minimally Verbal Autistic Children and Adolescents

Y. Chen, B. E. Siles, G. R. Liberti and H. Tager-Flusberg, Department of Psychological and Brain Sciences, Boston University, Boston, MA

Background: Approximately 30% of autistic individuals fail to acquire spoken language and remain minimally verbal (MV) into adulthood (Tager-Flusberg & Kasari, 2013). While a growing body of work focuses on defining MV autism based on expressive language, less is known about their receptive language skills and the proportion for whom receptive language is significantly higher than their expressive language. It is also important to investigate which factors contribute to the potential receptive advantage.

Objectives: To investigate the concurrent predictors of receptive language skills in MV autistic individuals, their receptive-to-expressive language discrepancy, and the predictors of a subgroup of MV autistic individuals with significantly better receptive language skills.
**Methods:** Data were obtained from the National Database for Autism Research (NDAR) and the SFARI Base from the Simons Foundation Autism Research Initiative. 1579 MV autistic individuals (321 Female; $M_{age}$=8.75 years, $SD=3.6$, range=5-18) were included in this study. The inclusion criteria were 1) met the Autism Diagnostic Observation Schedule (ADOS) Module 1 cut-off; 2) had an age-appropriate Vineland Adaptive Behavior Scales (VABS); 3) between 5 and 18 years old. Four empirically selected variables were included as potential predictors of receptive language in MV autistic individuals: nonverbal IQ (NVIQ) from Mullen or the Differential Ability Scales (DAS-II); autism symptom severity represented by the ADOS calibrated severity score; social skills reported by parents on the VABS; and motor skills reported on the Developmental Coordination Disorder Questionnaire (DCDQ). A significant receptive-to-expressive discrepancy was determined using the VABS pairwise-comparison critical values.

**Results:**

Chronological age was significantly correlated with VABS receptive language, $r(1386)=-.386$, $p<.001$, and was controlled for in subsequent analyses. Partial correlations controlling for age showed that NVIQ, autism symptom severity, social skills, and motor skills were all significantly correlated with VABS receptive language, $p<.05$. When considering these variables’ predictive values on VABS receptive language, a significant regression model emerged, $R^2=.44$, $F(5, 224) = 35.38$, $p<.001$. Social skill was the only salient factor predicting receptive language skills concurrently, $\beta=.102$, $p<.001$.

Regarding the receptive-to-expressive language discrepancy, VABS receptive language was significantly higher than expressive language, $t(1379)=39.05$, $p<.001$. Using the VABS pairwise-comparison critical values, 343 MV autistic individuals (24.9%) demonstrated significantly higher receptive than expressive language skills. A logistic regression was performed to investigate the effects of NVIQ, autism symptom severity, social skills, and motor skills on the likelihood that MV autistic individuals had significantly better receptive language or not. A significant model emerged, $\chi^2(5) =58.08$, $p<.001$, $R^2=.31$, and correctly classified 80% of cases. Increasing motor skills on the DCDQ was associated with an increase in the likelihood of better receptive language, odd ratio=1.04, 95% CI [1.01, 1.08], $p = .008$.

**Conclusions:** This study is the first to investigate the receptive-to-expressive language discrepancy in MV autistic individuals. Findings reveal that around 25% of MV autistic individuals demonstrated better receptive than expressive language skills. Social and motor skills contribute significantly to language comprehension in MV autistic individuals. Future interventions should consider targeting these two areas to optimize the outcomes of improving receptive language in MV autistic individuals.

**POSTER SESSION — COMMUNICATION AND LANGUAGE**

**412 - Communication and Language I**

**412.148 (Poster) A Comparison of Speech Entrainment Patterns in Autistic and Neurotypical Adolescents**

_C. J. Wynn, Communication Sciences and Disorders, University of Houston, Houston, TX_

**Background:**

Speech entrainment describes the tendency for interlocutors to modify their speech behaviors (e.g., articulatory precision, fundamental frequency, articulation rate) to more closely align with the behaviors of their conversation partner. In neurotypical individuals, entrainment is predictive of conversational efficiency, conversational quality, and stronger interpersonal relationships (e.g., Borrie et al., 2019; Wynn et al., 2022; Pardo et al., 2012). Entrainment requires a high level of social perception—one must recognize, understand, and adapt to social cues in the communicative behaviors of their conversational partner (Chartrand and Bargh, 1999; Delaherche et al., 2012). Accordingly, deficits in these areas may lead to differences in the entrainment patterns of autistic individuals compared with their neurotypical peers.

**Objectives:**

While a few studies have examined the speech entrainment patterns of autistic adolescents (Patel et al., 2022; Lehnert-LeHouviller et al., 2020), these studies have all focused on conversations in which adolescents spoke with an adult such as a parent or research confederate. Accordingly, information regarding speech entrainment patterns of autistic adolescents in conversations with their peers is currently unknown. Given the importance of conversation in adolescence, and the role of entrainment in conversational outcomes, research in this area is important. The purpose of this study is to examine the differences between the speech entrainment patterns of autistic and neurotypical adolescents in peer-based conversations.

**Methods:**

Currently, we have collected conversations from 51 conversational dyads (with additional data collection ongoing). All participants were adolescents between the ages of 10 and 17 years. Participants spoke English as their primary language and had no reported history of
hearing impairments. Participants were paired-up to form age-matched dyads consisting of either two neurotypical participants or one autistic and one neurotypical participant. Conversations were elicited using the Diapix Task, a task in which dyads must communicate with one another to identify 12 differences between sets of pictures. To analyze data, we use annotated Praat textgrids to extract acoustic-prosodic features representing rhythmic, articulatory, and phonatory aspects of speech. We then calculate scores for entrainment by taking the absolute difference between two speakers acoustic feature values on adjacent turns. Linear mixed models are used to compare differences between autistic and neurotypical speakers’ entrainment scores.

Results:

Data analysis is ongoing and will involve multiple acoustic-prosodic features. Preliminary analysis of articulatory precision showed a significant difference between the entrainment patterns of neurotypical and autistic interlocutors ($b = .21, p = .04$). That is, neurotypical speakers entrained more to their conversation partner than autistic individuals. There was no significant difference between neurotypical speakers in neurotypical-neurotypical and autistic-neurotypical dyads, indicating that neurotypical speakers entrained to a similar degree regardless of the neurotype of their conversation partner.

Conclusions:

Preliminary findings indicate that the entrainment patterns of neurotypical and autistic adolescents differ from one another. Given the role of entrainment in successful conversations (at least in neurotypical populations), these differences may be partially responsible for breakdowns in conversations between neurotypical and autistic adolescents. Future research should examine the relationship between entrainment and conversational outcomes within this population.

412.149 (Poster) A Linguistic Analysis of Autistic and Non-Autistic Adult Women’s Productions: Written Narratives of Emotional Autobiographical Memories

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Background:

Narrative research has been identified as a great tool in linguistic studies, as it ecologically reveals qualitative and quantitative differences in individuals experiencing communicative difficulties - but who still show good structural language skills (Geelhand et al., 2020; Manolitsi & Botting, 2011). Narrative research within the autistic population has until now included predominantly male samples, but it is nowadays argued that the communicative profile of autistic women might differ from men’s (Sturrock et al., 2020). However, the nature of this ambiguous profile of autistic women is still poorly understood. Moreover, most narrative studies rely on oral tasks; given that autistic adults tend to prefer written or computer-mediated communication (Gillespie-Lynch et al., 2020), it is surprising that the written communication of autistic adults hasn’t been thoroughly investigated yet.

Objectives:

This study aims at offering a better perspective on the specific challenges that autistic women face compared to non-autistic (NA) women, through a semi-structured written task that resembles everyday narrative situations (i.e., sharing memories).

Methods:

Participants were 15 autistic and 15 non-autistic (NA) cisgender women, pairwise matched on age ($M(\text{age}) = 34.73$). As the study took place during the height of the lockdown, recruitment and testing were done online and in writing. Participants were asked to write 4 autobiographical memories, based on 4 emotional cue words. No time limit was given, but a minimum and maximum number of characters were allowed for each narrative (1000-1800).

Results:

Groups differences were found in all aspects of the analysis, the first being the microstructure: autistic women wrote longer narratives, used more unique and infrequent words and showed greater vocabulary productivity than NA women. On the macrostructure level, autistic women showed reduced use of explicit causal connectives. As for the internal state language, autistic women used less cognitive state terms but slightly more perceptual terms than NA woman.

Conclusions:
Background: Emotional prosody provides acoustical cues that reflect a communication partner’s emotional state and is crucial for successful social interactions. Many children with autism have deficits in recognizing emotions from voices, however the neural basis for these impairments is unknown. Two hypotheses have emerged to explain the deficits in interpreting vocal-emotional cues in autism. The first hypothesis proposes that children with autism have a sensory processing deficit in which abnormal sensory processing of emotional prosody cues precludes access to downstream systems that evaluate and categorize these acoustical features. A second hypothesis posits that acoustical processing of emotional prosody cues is largely intact in children with autism, however impairments in social cognitive and evaluative processes preclude the accurate interpretation of emotional information from these vocal cues.

Objectives: We aimed to examine brain circuit features underlying emotional prosody processing deficits and their relation to clinical symptoms of autism. Understanding the relative contribution of auditory sensory and social cognitive systems to emotional prosody perception deficits in children with autism would provide important information regarding the nature of this communication impairment and may provide insight into its remediation.

Methods: We used an event-related fMRI task to measure neural activity and connectivity during processing of sad and happy emotional prosody and neutral speech in 22 children with autism and 21 matched control children (7-12 years old). We employed functional connectivity analyses to test competing theoretical accounts which attribute emotional prosody impairments to either sensory processing deficits in auditory cortex or theory of mind deficits instantiated in temporoparietal junction (TPJ).

Results: Children with autism showed specific behavioral impairments for recognizing emotions from voices. They also showed aberrant functional connectivity between voice-sensitive auditory cortex and bilateral TPJ during emotional prosody processing. Neural activity in bilateral TPJ during processing of both sad and happy emotional prosody stimuli was associated with social communication impairments in children with autism. In contrast, activity and decoding of emotional prosody in auditory cortex was comparable between autism and control groups and did not predict social communication impairments.

Conclusions: Our findings support a social-cognitive deficit model of autism by identifying a role for TPJ dysfunction during emotional prosody processing. Our study underscores the importance of “tuning in” to vocal-emotional cues for building social connections in children with autism.

Acoustic Analysis of Conversational Prosody in Individuals with ASD and First-Degree Relatives

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Background: Prosody is a crucial component of pragmatic (i.e., social) language that includes modulating intonation, rate, rhythm, and volume of speech, and relays important meaning about speaker intent and affect. Entrainment, a natural phenomenon where speakers become more similar to each other in communication style over the course of an interaction, is observed along prosodic dimensions, and is an important ingredient in social-communicative success. In autism, differences in aspects of prosody can impact social communication in important ways, including a lack of prosodic entrainment that may contribute to pragmatic challenges in autism more broadly. Similar, but subclinical, prosodic differences among parents of autistic individuals suggests that prosody, and reduced prosodic entrainment, may reflect a genetic influence. To investigate this possibility, and understand the significance of prosodic differences in ASD, a necessary next step is the acoustic characterization of prosody outside of structured contexts, that permit the study of prosody and entrainment in more naturalistic contexts that pervade our daily lives.
Participants included autistic individuals, parents of autistic individuals, and respective control groups (ASD=29, ASD-Par=58, Control=22, Control-Par=32). Conversational samples, derived from semi-structured social interactions with an examiner, were transcribed and utterances were coded for communicative intent (e.g., question, response, statement, acknowledge). Acoustic measurements of volume (intensity) and pitch (fundamental frequency; f0) were extracted at .01ms intervals. Mean volume and pitch variability (the range and standard deviation of f0) were calculated for each utterance. Utterances were analyzed based on communicative intent (e.g., question vs. statement), which influences expected prosodic contours. Entrainment was calculated as the difference between speakers’ acoustic features across the interaction. Group effects were examined between ASD/Control and ASD-Par/Control-Par groups. Secondary analyses explored parent groups by sex.

Results: The ASD group demonstrated a greater pitch variability when responding to examiner questions (p<0.05) and when asking questions (p<0.05) relative to controls. Differences in the ASD-Par group were exclusive to mothers, who exhibited greater pitch variability (p<0.05) when asking questions compared to Control-Par mothers. No significant differences were observed between ASD-Par fathers and controls. All groups were similar in volume of speech (p>0.2). Finally, the ASD group entrained less in measures of pitch than Controls (p<0.01). No differences were observed in parents’ entrainment patterns.

Conclusions: Findings revealed differences in acoustic measures of prosody in conversation, among autistic individuals and more subtly in their mothers, where greater variability in pitch was observed relative to controls. This pattern may reflect a “sing-song” intonation quality that is consistent with qualitative descriptions of prosodic patterns in autism. Such subtle differences observed in mothers, but not fathers, contribute to emerging evidence documenting patterns of lineality consistent with maternal inheritance for some pragmatic language features. Reduced entrainment of prosody was observed in autism, suggesting that a reduced tendency to align prosodic behaviors with social partners may contribute to the social-communicative profile of autism.

Background:

Autism Spectrum Disorder (ASD) is characterized by wide clinical heterogeneity including language skills. Existing morphosyntactic comprehension assessment tasks are inadequate for many autistic children. Accurately objectifying individual language skills in toddlers, and especially those with ASD, requires appropriate assessment, because language production is often minimal or nil at that age.

Objectives:

The aim of this study was to develop a passive assessment task of syntactic skills, suitable for French-speaking autistic toddlers, requiring neither expressive language nor behavior like pointing. In addition, this task should be sensitive to the remarkable evolution in syntactic skills observable in typically developing children between ages 2 to 5, in order to pinpoint evolving syntactic comprehension in young autistic children.

Methods:

We developed an intermodal preferential looking paradigm task with eye-tracking, to assess morphosyntactic comprehension. This task is adapted from previous work using a behavioral Intermodal Preferential Looking Paradigm for English-speaking autistic children (Naigles & Fein, 2017). Our task is composed of simple, short sentences testing the comprehension of four structures: intransitive verbs in SV sentences (subject + verb), word-order in simple transitive SVO sentences, with reversible animate agent and patient, accusative clitic pronouns, and present and past tense in transitive sentences. Two videos are displayed, one by one, and then simultaneously on either side of the screen. Children’s gaze direction is recorded when (s)he hears a target sentence congruent with one video. The only explicit instruction is to look at the screen. Data were analyzed by defining Areas of Interest (AOI) in eye recordings, corresponding to the location of each video, and fixation duration was measured on each AOI. Here, we consider items selected after validation, based on different criteria (total duration fixation > 1000 msec, duration fixation for congruent video > for distractor video, significantly tested with chi2 method). We calculated the percentage of successful items, per child, per structure, meeting the selection criteria.

Participants were all-comer children aged 30mo to 71mo recruited in day care centers and kindergartens (N = 48, mean age = 51.92 ± 12mo.); autistic children are currently being tested.
Results:

According to selection criteria, the majority of the children (73%) succeeded most items of most conditions: the fixation duration in the congruent AOI is significantly longer than in distractor AOI. An ANCOVA with age as covariate showed a significant age effect (F(1, 187) = 10.02, p<.01): the older the children, the more items they looked more at the target video, for all four structures.

Conclusions:

This task appears to be an appropriate assessment of the morphosyntactic comprehension in toddlers. Most of the children looked significantly more at congruent videos compared to distractor videos, for the most of the items. Variances analyses showed an effect of age on success. The evolution of the children’s success at this task appears to reflect syntactic development in this age range.

Autistic toddler testing under way should confirm the relevance of this task for autism research on early steps in development.

**412.153 (Poster) Associations between Bilingualism, Executive Function, and Core Autism Traits**


**Background:**

The concept of a ‘bilingual advantage’ suggests individuals fluent in two languages develop cognitive advantages, particularly within the executive function (EF) domain. Bilingualism in children with autism spectrum disorder (ASD) is understudied. Previous work revealed associations between bilingualism and EF skills and between EF skills and autism traits, including perspective taking difficulties, social communication difficulties, and repetitive behavior. However it remains unknown whether bilingual children with ASD can compensate for autism-related difficulties, and what role EF plays in this process.

**Objectives:**

We investigated the role of EF in the relationship between bilingualism and autism traits in children with and without ASD. This work has three research aims: 1) Replicate prior work suggesting an ASD bilingual advantage for EF skills, 2) Assess whether bilingual children have less severe ASD traits than monolingual children, and 3) Investigate whether EF is a mediator between bilingualism and core ASD traits.

**Methods:**

Participants included 53 children with ASD (21 bilingual) and 63 typically developing (TD) children (38 bilingual). All children were between the ages of 7-12 years. The Behavior Rating Inventory of Executive Function (BRIEF) was utilized to measure EF. These ratings are more reflective of caregivers’ EF concerns across contexts than lab-based measures. Parents completed the Children’s Empathy Quotient (EQ-C; to assess perspective taking), Social Communication Questionnaire (SCQ; to assess social communication) and Repetitive Behavior Scale-Revised (RBS-R; to assess repetitive behaviors) to quantify the degree or severity of ASD symptoms. All statistical analyses included covariates of age, full-scale IQ, and social status. The first set of models predicted EF skills from diagnosis and bilingual status. The second set of models predicted ASD symptoms from diagnosis and bilingual status. The final set of models tested whether EF skills mediated an indirect association between bilingualism and reduced ASD symptoms. We focused our examination of EF on the Inhibit, Shift, and Emotional Control subscale scores due to the previously hypothesized mechanistic role of bilingualism on control and switching processes.

**Results:**

Compared with TD children, children with ASD had significantly more EF difficulties, as evidenced by higher BRIEF subscale scores, p<.05. Regression analyses predicting Inhibit and Emotional Control scores revealed significant interactions between diagnosis and bilingual status, such that bilingualism seemed to work as a protective factor supporting inhibition (p=.003) and emotional control (p=.034) skills in children with ASD, but not TD children (Figure 1). The model predicting EQ scores revealed a marginally significant main effect of bilingualism (p=.050) suggesting a direct effect of bilingualism on perspective taking, such that bilingual children regardless of diagnosis have a somewhat improved ability for understanding how others feel. Finally, all three tested EF subscales mediated significant indirect effects of bilingualism on perspective taking, social communication, and repetitive behaviors (Table 1).

**Conclusions:**
Together the results suggest that one potential path towards mitigating core ASD symptoms may be through stronger EF skills bolstered by bilingual experience. These results are the first to our knowledge to demonstrate the cascading supportive influences bilingual experience can have on reducing ASD related symptoms.

412.154 (Poster) Feasibility of Longitudinal Telephone-Based Voice Sampling in Autistic Children and Teens


Background: Voice biomarkers of neurodevelopmental conditions like autism are a key component of large-scale digital phenotyping efforts aimed at inexpensively and densely monitoring treatment progress and predicting long-term outcomes. Although voice biomarkers are often touted as context-independent “objective” markers (in contrast to semantically-rich-but-context-dependent lexical or language features) the stability of these markers over time in autistic children, and their sensitivity to changing conditions from day-to-day, are not well understood.

Objectives: (1) Assess the feasibility of a 10-week telephone-based study for collecting home-based naturalistic language samples from 6-17-year-old children with or without autism and their parent/caregiver (target: 48 participants, half with autism and half without autism, half male and half female, IQ>75 stratified by age), and (2) To improve future retention, identify causes of attrition or failure to complete the study after enrolling.

Methods: Potential participants aged 6-17.99 years were identified using an electronic health record system at a large hospital-based academic medical center in the U.S., flyers and inquiry forms, and internal databases. After families responded with interest, study staff made informational telephone calls. Following these calls, interested families scheduled a telephone screening interview (TSI) with study staff (~40-60 minutes) to assess eligibility. If children were eligible to participate, an electronic consent form was completed prior to scheduling video call-based clinical assessments to measure language skills and generate IQ estimates. Following study consent, a record review (i.e., past evaluations, medical records) was conducted by a clinician to confirm diagnostic group status for the autism group (ASD intake), while typically developing controls did not require this step (TDC intake). Voice collection occurred once per week for seven weeks (~30-60 minutes per session), while clinical assessments typically required an additional three weeks (10 weeks total). Participants were compensated for their time.

Results: One hundred twelve (112) telephone screening interviews were conducted between November 2020 and August 2022. After completing the telephone screening interview, 58 families consented to participate by signing an electronic consent form (51.79%), and 54 did not (48.21%; see Tables below). Among consenting families, 47 completed all seven voice collection calls and additional study components (81.03% completion rate), while 11 were re-assigned to the “Not Currently Participating” category (18.97% attrition rate; 7/11 were originally in the autism group; see Tables). Primary reasons for withdrawal after consenting to participate included time and scheduling issues (n=3), ineligibility after record review (n=4), and loss of contact (n=4).

Conclusions: Home-based telephonic collection of naturalistic voice samples from autistic children and teens is highly feasible, even with a 10-week timeline. Although just over 50% of interested families continued past the telephone screening interview, 81% of enrolled participants ultimately completed the study. As voice interactions are important for success in educational and employment contexts, understanding voice-based markers of autism could lay important groundwork for maximizing successful integration in these domains. Finally, evidence of feasibility in longitudinal naturalistic voice sampling protocols for individuals on the autism spectrum lends credence to its promise as an inexpensive, high-frequency method for monitoring progress due to interventions or developmental change.

412.155 (Poster) Autistic Girls and Boys Employ Different Strategies during Natural Conversations


Background: Autistic girls are under-diagnosed compared to boys, even when they experience comparable clinical impact. Previous studies suggest that autistic girls present with distinctive symptom profiles in a range of areas, including natural speech, which may make it more challenging to identify and diagnose girls and provide them with appropriate social support. To improve our understanding of
Objectives: To investigate potential sex differences in the temporal dynamics of verbally fluent autistic children’s speech during natural conversations with a novel interlocutor.

Methods: Forty-five autistic children (16 girls, mean age: 11.5±2.8 years, mean full-scale IQ: 105.8±12.1, mean ADOS-2 total: 6.4±2.0) and 47 NT children (24 girls, mean age: 10.1±2.8 years, mean full-scale IQ: 108.6±12.3, mean ADOS-2 total: 1.2±0.4) participated in a 5-minute “get-to-know-you” conversation with a novel young adult interlocutor who was unaware of children’s diagnostic status. Groups were matched on the sex ratio and IQ scores, but not on age. Autistic boys and girls did not differ on any other demographic or clinical characteristics. Recordings were time-aligned and orthographically transcribed by trained annotators, and turns were defined based on speaker change during conversations. Several duration measures, including total speech time, overlapping speech duration, mean speech segment duration, between-turn pause durations, and total number of words were calculated. Groups were compared using analysis of covariance models, controlling for age.

Results: Autistic girls spoke longer in total than autistic boys (p=0.002; Fig.1A) and produced longer speech segments on average than all other groups (vs. autistic boys: p=0.011; vs. NT boys: p=0.038; vs. NT girls: p=0.008, Fig.1B). Autistic girls produced significantly more words in total than autistic boys (p=0.026), but they did not differ from NT children in total word counts or speaking rate. In contrast, autistic boys spoke more slowly than NT children (vs. NT girls: p=0.046, vs. NT boys: p=0.027) with fewer words in total than NT boys (p=0.049). Autistic boys interrupted interlocutors’ speech less often than autistic girls (p=0.025) and NT children (NT boys: p=0.025; NT girls: p=0.004; Fig.2A) and produced longer between-turn pauses (i.e., longer latency duration to respond; Fig.2B) than autistic girls (p=0.012), NT boys (p=0.029), and NT girls (p=0.004).

Conclusions: Results suggest that verbally fluent autistic girls and boys have different natural language profiles, even when matched on autism symptoms. Establishing the exact nature of verbal communication differences paves the way for the development of sex-sensitive screening and diagnostic tools to more quickly and precisely identify autistic girls and boys. This method may also be used to guide the development of individualized interventions that enhance both short- and long-term social communication outcomes for autistic children.

412.156 (Poster) Autistic Teenagers Lexically Align at Similar Rates to Typically Developing Peers

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Background: Lexical alignment refers to speakers’ matching the language their conversation partner uses.[1] Because lexical alignment relates to effective social communication,[2] individuals with Autism Spectrum Disorder (ASD; characterized by deficits in social communication) may underperform compared to typically developing (TD) individuals. However, no significant differences in lexical alignment have emerged between school-age TD children and highly verbal children with ASD.[1,3]

Objectives: We aim to replicate previous research [1] with older participants and with an autistic sample ranging broadly in verbal ability. We incorporate measures of language and social communication to examine how these factors relate to lexical alignment.

Methods: The sample included 17 TD and 13 autistic teenagers who ranged from low-verbal to highly verbal (as measured by the CELF-5; Table 1). The participants and investigator played the “Snap” game,[1] wherein players take turns naming items in picture cards. The investigator primed each target item with either its preferred (e.g., cat) or dispreferred (e.g., kitten) name. Two turns later, the participant would see and name the same target image. Targets were either natural kinds (e.g., rabbit/bunny; n=7) or artifacts (e.g., couch/sofa; n=13). The participant’s word choice for each target item was coded as 1 (matching the investigator) or 0 (non-matching). Overall matching scores were calculated as the number of matched trials out of 20 target items. A difference score for each participant was calculated by finding the absolute value of dispreferred name use after preferred primes minus dispreferred name use after dispreferred primes; higher difference scores indicated greater alignment on dispreferred terms (Table 1).

Results: Paired-samples t-tests by diagnostic group revealed that both groups produced the dispreferred term significantly more often when primed with the dispreferred term (M(SD)TD = 0.48(0.19); M(SD)ASD = 0.50(0.22)) than when primed with the preferred term (M(SD)TD = 0.06(0.08); M(SD)ASD = 0.04(0.06)). The TD group’s difference scores were not significantly different from the autistic group’s (t(28) = -0.49, p = .636). A mixed-model ANOVA compared difference scores by item type and diagnostic group, yielding a main effect of item type: difference scores for natural kinds were higher than difference scores for artifacts (F(1,28) = 4.78, p = .037), with no significant interactions (p = .636). The TD group’s difference scores did not correlate with their total CELF-5 scores (Figure 1a), nor with their ADOS-2 social interaction/communication (SC) scores (Figure 1b). The autistic group’s difference scores yielded a marginally significant positive correlation with their total CELF-5 scores (Figure 1c), as well as a marginally significant negative correlation with their SC scores (Figure 1d).
Conclusions: Our findings in this study indicate that autistic individuals, even into their teenage years and young adulthood, lexically align at the same rates as TD individuals during a structured task. We additionally demonstrated that language and social communication, as measured by the CELF-5 and ADOS-2, respectively, are unrelated to lexical alignment in TD teens but may be related in autistic teens. Finally, TD and autistic teens may find the preferred and dispreferred names for natural kinds more interchangeable than those for artifacts.

412.157 (Poster) Autistic and Neurotypical Children’s Social Impressions of Off-Topic and Delayed Responding
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Background:
On average, autistic groups are more likely than non-autistic groups to respond in an off-topic manner (Sng et al., 2020), and/or to leave significantly longer turn-taking gaps (Ochi et al., 2019). Exhibiting unconventional conversational behaviours could result in negative social impressions of autistic children from their neurotypical peers (e.g., Place & Becker, 1991). However, it is possible that autistic individuals do not make the same social judgments due to different communicative preferences (Granieri et al., 2020).

Objectives:
This study aimed to determine whether autistic children pattern similarly or differently to their neurotypical peers in rating off-topic or delayed responding as a deterrent to friendship or interaction, and if not, whether they are aware of the societal dispreference for these behaviours.

Methods:
Current results are based on twenty-eight participants (N=14 per group), but the final (pre-registered) sample will include thirty-six neurotypical and thirty-six autistic children. All participants are aged between 9:0 and 13:11-years, and groups are matched on chronological age, gender ratio, core language ability, and non-verbal reasoning skills. Participants listened to several short audio clips of conversations containing six conversational turns between two children. For each conversation, participants rated four statements on a 0-100 scale: two capturing their personal preferences, such as “I would enjoy chatting to the [target speaker]”, and two regarding their perceptions of “Most other people’s” impressions. A conversation production measure was also used to observe participants’ tendency to provide off-topic or delayed responses themselves.

Study 1 manipulated the typicality of the target speaker’s responses via the content of their utterances (On-topic vs. Off-topic). One example of an off-topic response to the statement “I went to that new restaurant in town last night” is “Oh no, I think my library books are due in today”. Study 2 manipulated the timing of the target speaker’s conversational turns. That is, the responses were all on-topic, but either came 200-msec after the offset of the preceding utterance (Typical) or 3000-msec after (Delayed).

Results:
Linear mixed effects models were conducted to compare participants’ ratings for On-topic vs. Off-topic conversations, and for Typical vs. Delayed conversations. In Study 1, participants rated On-topic conversations significantly more favourably ($M = 73.67$) than Off-topic conversations ($M = 46.37$) ($p<.001$). Similarly, in Study 2, there was a significant main effect of Timing (Non-delayed $M = 73.67$, Delayed $M = 64.68$, $p = .014$). For both studies, there was no interaction, and no effect of Diagnostic Group (Autistic $M = 59.97$, Neurotypical $M = 63.17$), with a small effect size for both the Topic ($d = .02$) and Timing ($d = .19$) analyses.

Conclusions:
The absence of interaction effects and main effects of Diagnostic Group (with very small effect sizes) suggests that autistic children are just as likely as their neurotypical peers to dis-prefer speakers who provide ‘atypical’ conversational responses. While it is possible that some autistic adults may develop a preference for atypical communication styles, it appears that the preferences of autistic children are not only indistinguishable from that of neurotypical children, but also align with their perceptions of societal norms.

412.158 (Poster) Automatic Speech Recognition for Autism Using the Open-Source Whisper Model from Openai

Objectives:
Individuals do not make the same social judgments due to different communicative preferences (Granieri et al., 2020).

Methods:
Linear mixed effects models were conducted to compare participants’ ratings for On-topic vs. Off-topic conversations, and for Typical vs. Delayed conversations. In Study 1, participants rated On-topic conversations significantly more favourably ($M = 73.67$) than Off-topic conversations ($M = 46.37$) ($p<.001$). Similarly, in Study 2, there was a significant main effect of Timing (Non-delayed $M = 73.67$, Delayed $M = 64.68$, $p = .014$). For both studies, there was no interaction, and no effect of Diagnostic Group (Autistic $M = 59.97$, Neurotypical $M = 63.17$), with a small effect size for both the Topic ($d = .02$) and Timing ($d = .19$) analyses.

Conclusions:
The absence of interaction effects and main effects of Diagnostic Group (with very small effect sizes) suggests that autistic children are just as likely as their neurotypical peers to dis-prefer speakers who provide ‘atypical’ conversational responses. While it is possible that some autistic adults may develop a preference for atypical communication styles, it appears that the preferences of autistic children are not only indistinguishable from that of neurotypical children, but also align with their perceptions of societal norms.
Methods: 90 parent-child dyads (20 female) (M age=74.96 months, SD=12.85, Age range=49–95). participated in study conducted whether these relationships differed for minimally verbal compared to verbal children.

Results: Whisper significantly outperformed the commercial solution across all cohorts (p<0.05) by approximately 10%, resulting in an average WER of 20% (Figure 1). The largest increase in performance was observed in autistic individuals with IQs < 70, with an increase of ~17%. However, this cohort still had significantly higher error rates than the others, with an average WER of 25%.

Conclusions: ASR is rapidly improving: the recently released algorithm from OpenAI outperforms last year’s front-running commercial solution. Importantly, the largest improvement was for autistic individuals with IQs < 70. These results show the promise of objectively and automatically evaluating communication abilities in autism.

Background: Challenges in social communication and interaction are a core symptom domain in autism. Novel therapies are under development to help individuals with these challenges. However, commonly used clinical measures lack the sensitivity to assess potential improvements in communication ability, and are often time-consuming and subjective. Expressive Language Sampling (ELS) through structured conversations has emerged as a promising way to measure expressive communication abilities. ELS is typically performed in a clinical setting with a trained conversation partner or physician. Here, we aim to probe naturalistic conversations with family members in home settings that may be more representative of everyday life. At-home assessments can be performed multiple times throughout a study to minimize the impact of day-to-day variations without the added burden and costs associated with in-clinic visits.

While several studies have used automated acoustic and linguistic analysis methods to study autistic speech, they require manual transcripts from trained professionals as a first processing step. In order to bypass this time-consuming and costly process, automatic speech recognition (ASR) is required. While major progress has been achieved in this field, particularly with the input of major tech companies, the applicability of ASR to natural conversations in real world environments with individuals with irregular speech patterns has been lacking. Recently, an open-source ASR algorithm called Whisper has been released by OpenAI that appears to outperform its competition.

Objectives: We investigate the performance of OpenAI’s Whisper in transcribing the speech of autistic individuals during natural conversations, and compare it with a cloud-based commercial solution which we have previously found to be the front-runner for ASR in autism.

Methods: 90 autistic individuals and 45 neurotypical controls (NTCs) between the ages of 5 and 45 were enrolled into a non-drug observational study (NCT03611075). They were asked to record a 5 minute conversation at home with a conversation partner once per week over a 12-week period. Autistic individuals were categorized based on IQ (threshold of 70) to assess the utility of the ASR algorithms for participants that vary on this dimension. Manual transcripts were obtained for 294 conversations from 59 participants. Automatic transcripts were obtained using Whisper and the commercial solution. Performance was measured using the word error rate (WER; %) which is typically on a scale from 0-100, with lower numbers indicating better performance. All paired statistical comparisons were performed using Wilcoxon Signed Rank tests.

Results: Whisper significantly outperformed the commercial solution across all cohorts (p<0.05) by approximately 10%, resulting in an average WER of 20% (Figure 1). The largest increase in performance was observed in autistic individuals with IQs < 70, with an increase of ~17%. However, this cohort still had significantly higher error rates than the others, with an average WER of 25%.

Conclusions: ASR is rapidly improving: the recently released algorithm from OpenAI outperforms last year’s front-running commercial solution. Importantly, the largest improvement was for autistic individuals with IQs < 70. These results show the promise of objectively and automatically evaluating communication abilities in autism.

Background: Fine motor skill is associated with expressive language outcomes in infants with an autistic sibling and in young autistic children. Few studies have focused on school-aged children even though around 80% have motor impairments (Bhat, 2021) and 30% are minimally verbal (MV) into their school years (Norrelgen et al., 2015). Moreover, expressive language is not a unitary construct, but it is lacking. Recently, an open-source ASR algorithm called Whisper has been released by OpenAI that appears to outperform its competition.

Objectives: We investigate the performance of OpenAI’s Whisper in transcribing the speech of autistic individuals during natural conversations, and compare it with a cloud-based commercial solution which we have previously found to be the front-runner for ASR in autism.

Methods: 90 autistic individuals and 45 neurotypical controls (NTCs) between the ages of 5 and 45 were enrolled into a non-drug observational study (NCT03611075). They were asked to record a 5 minute conversation at home with a conversation partner once per week over a 12-week period. Autistic individuals were categorized based on IQ (threshold of 70) to assess the utility of the ASR algorithms for participants that vary on this dimension. Manual transcripts were obtained for 294 conversations from 59 participants. Automatic transcripts were obtained using Whisper and the commercial solution. Performance was measured using the word error rate (WER; %) which is typically on a scale from 0-100, with lower numbers indicating better performance. All paired statistical comparisons were performed using Wilcoxon Signed Rank tests.

Results: Whisper significantly outperformed the commercial solution across all cohorts (p<0.05) by approximately 10%, resulting in an average WER of 20% (Figure 1). The largest increase in performance was observed in autistic individuals with IQs < 70, with an increase of ~17%. However, this cohort still had significantly higher error rates than the others, with an average WER of 25%.

Conclusions: ASR is rapidly improving: the recently released algorithm from OpenAI outperforms last year’s front-running commercial solution. Importantly, the largest improvement was for autistic individuals with IQs < 70. These results show the promise of objectively and automatically evaluating communication abilities in autism.
Controlling for adaptive behavior (VABS-3 standard score) and age. Finally, simple linear regression adjusted for multiple comparisons was used to test for differences between minimally verbal and verbal groups.

Results: Fine motor skill significantly predicted percent intelligible utterances. Fine motor skill and adaptive behavior were significant predictors of mean length of utterance in morphemes. Adaptive behavior, but not fine motor skill, predicted number of conversational turns. Simple linear regressions by group (minimally verbal versus verbal) corrected for multiple comparisons showed that fine motor skill predicted intelligibility for minimally verbal but not verbal children (see Figure 1). Fine motor skill and adaptive behavior predicted mean length of utterance for both minimally verbal and verbal children (see Figure 2).

Conclusions: Fine motor skill affects expressive language for autistic children into their early school years. Speech is more affected for minimally verbal children, and structural language is affected for both minimally verbal and verbal children. These findings suggest that autistic children may benefit from supports targeting fine motor along with speech (for minimally verbal) and language (for minimally verbal and verbal) into their school years.

412.160 (Poster) Can Minimally Verbal Individuals with Autism Read? Hidden Literacy Revealed Via Eye Movements
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Background: Autistic children and adults with little or no spoken language who are considered 'minimally verbal' (mvASD) are estimated as 30% of the spectrum. They are typically judged as 'low functioning' or cognitively impaired due to low scores in the conventional assessments of cognitive abilities. However, it is unclear whether these failures reflect an actual cognitive impairment, or alternatively, a severe deficit in behavioral expression of cognitive skills such as reading. To explore this alternative, we hypothesized that some or many of these individuals have a severe deficit in the initiation and control of reliable voluntary actions, which calls for using involuntary or effortless measures such as small eye gaze lateralization. We further hypothesized that the deficit could originate from a deficit in recruiting phasic arousal. Preliminary results from this study were presented in INSAR 2019 and 2021.

Objectives: Assess basic reading and lexical-semantic knowledge in young adults with mvASD using eye-movement measures in comparison to pointing performance and investigate transient pupillary responses as a measure of phasic arousal.

Methods: A group of adolescents or young adults (N=27), 15-30 years old, diagnosed with ASD and with little to no functional language (less than 30 communicative words) were tested on a novel "cued looking" paradigm (adaptation of "looking-while-listening"; Fernald et. al., (2008)). Participants watched a sequence of stimuli while their eyes were tracked. In each trial, a text word was presented at fixation (1s), followed by a pair of familiar object pictures presented (1s) side by side, with next trial following after 800ms. There were 4 short runs (<1 min) repeated 3-6 times in random order. In a second experiment, the written words were replaced by recorded words. In a third (reading) and fourth (listening) experiments, the same pictures and text were used on 20 cards to measure performance via pointing. We analyzed the lateralization of the eye-gaze according to target side as well as pupil dilation.

Results: 22 of the 27 mvASD participants (81%) showed a significant effect of reading as reflected by correct lateralization (~85% group average), with similar results obtained for spoken words. In a striking contrast, most of the MVs who showed significant reading via eye gaze, were at or near chance level in pointing (group average <60%) making their reading skills “hidden” to standard testing. To investigate the cause for this anomaly, we analyzed the transient pupil dilation associated with the eye gaze, which we found to be reduced in the mvASD group compared to controls.

Conclusions: These results provide the first systematic evidence for reading ability in mvASD individuals typically assumed to be severely language and cognition impaired. The results also demonstrate a striking anomalous gap between pointing performance and eye-gaze, which opens the way for uncovering unknown cognitive abilities in mvASD. Our results of reduced pupil dilation provide a first hint at the possible cause of the anomaly in terms of reduced phasic arousal subserving many cortical circuits that drive behavior.

412.161 (Poster) Child and Parental Gesture As a Precursor to Executive Function and Language in Autism Spectrum Disorder
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Background:

It is well-known that gesture precedes and predicts language (Iverson & Goldin-Meadow, 2005, Rowe et al., 2008). Emerging evidence indicates that gesture is also predictive of executive function (EF), with language mediating the relation between gesture and EF (Kuhn et al., 2014). These findings suggest the important role of gesture in the development of language as well as cognitive abilities. While these
associations have been investigated in neurotypical children, it is unknown whether similar relations among gesture, language, and EF are found in toddlers diagnosed with autism spectrum disorder (ASD). In addition, we could identify no studies that have examined whether parental gesture use is related to EF abilities in ASD toddlers.

Objectives:
The objective of this study was to examine associations among gesture use by ASD toddlers and their parents, language, and EF abilities.

Methods:
Data were collected as part in an ongoing study to chart the trajectory of EF in ASD and identify its predictors at multiple levels. Participants included 51 parents and their toddlers diagnosed with ASD (Mage = 30.9 months; SDage = 3.8). Children (37 boys, 14 girls) and their parents engaged in a 10-minute free play interaction in lab where they were asked to play as they normally would at home. Gestures from ASD toddlers and parents were reliably coded from videotaped sessions of parent-child interactions following previous research (Choi et al., 2019; Özçalışkan & Goldin-Meadow, 2009). Children’s language skills were measured using the Mullen Scales of Early Learning (Mullen, 1995), and EF skills were assessed using seven tasks that were designed to measure three dimensions of EF in young children: set-shifting (e.g., spatial reversal, Preschool EF Battery [PEFB] flip book; Garon et al., 2014), inhibition (e.g., PEFB tricky box), and working memory (e.g., PEFB hide-and-seek).

Results:
Child gesture use was significantly, positively related to receptive language (r(49) = .369, p = .008), and this association remained significant even when controlling for child sex and parent education. Child gesture was positively related to set-shifting, although this was approaching statistical significance in this preliminary dataset (r(40) = .300, p = .053). Receptive language was significantly, positively correlated with set-shifting. In addition, parent gesture use was significantly, positively related to their toddlers’ gesture use (r(49) = .283, p = .040) as well as set-shifting (r(40) = .377, p = .014).

Conclusions:
These findings indicate that ASD toddlers who gestured more had better language and EF skills and that language may play a mediating role in the relation between communicative gestures and EF abilities in ASD toddlers similar to neurotypical children. Parents who gestured more had children who gestured more and who also were more efficient when shifting between responses. This preliminary analysis examined concurrent relations among gesture, language, and EF; however, our prospective longitudinal design will allow us to further explore whether these variables influence each other over time. Findings from our work will have both theoretical and clinical implications to enhance our understanding of relations among communication, language, and cognition and to inform the design of ASD interventions.

412.162 (Poster) Communicative Individual Variance Using Resting-State Functional Magnetic Resonance Imaging
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Background: Communication in dialogue requires skills that go beyond structural language abilities. This includes tailoring your message to the conversational partner and making inferences beyond the literal meaning of utterances, abilities that have been investigated as part of pragmatics. It has been noted that speakers with ASD underperform on most pragmatic measures, even when the comparison group has been matched for structural language skills (Volden, 2017).

Objectives: Our aim was to investigate neural markers of pragmatic individual differences, using resting state fMRI-data. We capitalized on individual variation in pragmatic skills in the general population.

Methods: We created groups (High score vs Low score) from the CIV (Communicative Individual Variance) sample, consisting of N=199 participants including measurements of two behavioural pragmatic tasks, also including 61 participants (age 18-36, 28 males) with fMRI-data (with a third pragmatic task and resting state, see Bendtz et al. (2022)). Experimenter were blind to the group-status of the participant.

The study design, including a pilot phase, was recorded at OSF prior to analysis (https://osf.io/keqws/). We used previously not analyzed resting-state fMRI-data acquired just before task data, in the CIV-sample. We here focus (see OSF for all questions) on the functional connectivity between two cortical clusters defined by the pragmatic task data from the CIV-sample (see Bendtz et al. 2022); (1) left superior and inferior lateral parietal cortex, and (2) bilateral dorsal precuneus. In Bendtz et al. (2022), individuals with higher pragmatic skills showed greater activation compared to individuals with lower pragmatic skills, in these two regions. We asked whether the High
score group would show increased connectivity between these two regions, compared to the Low score group, prior to performing any pragmatic task.

To obtain a single BOLD signal time course for each region of interest (ROI), the voxel-wise time courses were averaged. In the Conn-toolbox, the two ROIs were correlated against one another with a Pearson’s product-moment bivariate correlation, representing the level of functional connectivity between those regions, also known as ROI-to-ROI connectivity.

Results: Our results in both pilot study and the main study (see Graphics) show that individuals with higher pragmatic ability had significantly greater functional resting state connectivity between the two investigated clusters, than individuals with low pragmatic skills.

Conclusions: We show that the functional connectivity of the ParPrec-clusters during a resting-state scan is modified by pragmatic skill, showing a potentially relevant new neural marker for pragmatic individual differences. The relevance of the coordination in this pair of regions, for highly skilled pragmatic processing, is strengthened if also considering the already published results in Bendtz et al. (2022). Note that this mini-network represents a neural marker of communication outside the language network. Thus, the neural individual variability we point to may in the future be investigated in ASD, to understand the underlying cause for why pragmatic problems are disproportionally observed in ASD, over and above structural language difficulties.

412.163 (Poster) Correlations between Auditory-Perceptual Speech Features and Language Skills in Low and Minimally Verbal Autistic Individuals

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Background: A wide range of language skills is well documented in autism spectrum disorder (ASD). The factors underlying this variance remain unclear. Identifying valid predictors of language skills in ASD would directly inform early detection of language impairments and the development of high-quality interventions. We hypothesize that some children with ASD exhibit abnormal speech motor control and that these deficits are associated with decreased language skills.

Objectives: (1) Determine the presence, nature, and severity of auditory-perceptual signs of dysarthria among low and minimally verbal (L/MV) autistic individuals; (2) Determine if auditory-perceptual signs of dysarthria are correlated with expressive and receptive language abilities among L/MV autistic individuals.

Methods: 54 L/MV autistic individuals aged 4–18 were videotaped completing Section 2 of the Kaufman Speech Praxis Test, which involves imitating speech sounds ranging from single phonemes to two-syllable words. Expressive language was quantified as the number of different words (NDW) spoken during a natural language sample. Receptive language was quantified using the Peabody Picture Vocabulary Test-4 (PPVT). Three experienced speech-language pathologists rated each participant’s speech for 13 auditory-perceptual features reflecting specific aspects of speech production or overall speech effectiveness (i.e., vocal quality, intensity, pitch, consonant accuracy, vowel accuracy, resonance, stress, rate, coordination, consistency, listener effort, intelligibility, and overall severity). Ratings were made on a 5-point dichotomous-ordinal scale ranging from “no impairment” to “profound impairment,” with an additional option for “cannot judge.” Inter-rater reliability was measured with Kendall’s coefficient of concordance, intra-rater reliability was measured with weighted Cohen’s kappa, and internal consistency was measured with Cronbach’s alpha. A Rasch analysis was performed to (1) examine each child’s overall speech production skills, (2) examine the relative prevalence of aberrant speech features in the sample, and (3) handle missing data related to participants’ L/MV status.

Results: Inter-rater reliability ranged from W = .37 (pitch) to W = .83 (vowel precision). Intra-rater reliability ranged from κ = .46 (rate) to κ = .93 (vowel precision). Cronbach’s alpha for the 13 speech features was α = .94. Rasch analysis revealed that features related to articulatory control (e.g., vowel precision, consonant precision, consistency, intelligibility) were significantly more impacted than features related to laryngeal, respiratory, or velopharyngeal control. Features strongly correlated with expressive language included intelligibility (ρ = .78) and vowel precision (ρ = .73). Features strongly correlated with receptive language included consonant precision (ρ = .81) and intelligibility (ρ = .79). Overall speech production ability across features was strongly correlated with PPVT scores (ρ = .70) and NDW (ρ = .62), p < .001 for all correlations mentioned above.

Conclusions: Features varied in reliability given participants’ limited speech production; however, the internal consistency of the 13 auditory-perceptual features was very high. Using an innovative analysis technique, individual speech features and overall speech production ability were found to be significantly correlated with expressive and receptive language. These results have significant potential to advance our understanding of language development in ASD, aid early assessment of language skills, and contribute to the development of high-quality language interventions.
Disfluency Use As a Window to Pragmatic Language Competence in Bilingual Children with and without Autistic Spectrum Disorders

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Background: Speech disfluencies may serve pragmatic purposes such as signaling upcoming delays to the listener. Recent studies show that monolingual autistic children produce fewer filled pauses and prolongations than their non-autistic peers (Wiklund & Laakso, 2020). Although bilingualism has been reported to be beneficial with regard to pragmatic abilities, little research has been conducted on how disfluencies can serve pragmatic functions in bilingual autistic and non-autistic children. A comparison of narratives in both languages allows better identification of language-specific vs. language-universal usage of disfluencies in children.

Objectives: This study aimed to investigate how bilingual autistic children (BI-ASD) and their non-autistic peers (BI-TLD) use typical disfluencies in both languages (Heritage (HL-Russian) and Societal (SL-Hebrew) languages). The second aim was to determine whether children’s usage of disfluencies differed across their two languages.

Methods: Participants included HL-Russian SL-Hebrew autistic children (BI-ASD, n=21) and their bilingual non-autistic peers (BI-TLD, n=30) aged 5-9 years. Narratives from the LITMUS-MAIN battery (Gagarina et al., 2012) were transcribed and coded in HL-Russian and SL-Hebrew for eleven disfluency types. Between-group (BI-ASD vs. BI-TLD) and within-group (HL-Russian vs. SL-Hebrew) comparisons of eleven disfluency types were conducted.

Results: By comparing disfluency use in both languages of bilinguals, this study demonstrated that HL-Russian posed an additional processing cost resulting in more disfluencies in both groups. Furthermore, both groups produced more errors in their weaker HL-Russian
than in SL-Hebrew. This study confirmed fewer listener-oriented filled pauses production in HL-Russian, as previously reported for monolingual autistic children with ASD (Heeman et al., 2010; MacFarlane et al., 2017) whereas in SL-Hebrew, no significant differences were observed between the two groups. Comparisons of disfluency types across the two languages showed consistent patterns in both languages in the BI-ASD group, while children with BI-TLD varied their disfluency use patterns in accordance with language-specific constraints of each language, probably reflecting a higher degree of pragmatic ability to adapt to a listener's language.

Conclusions: A higher total disfluency ratio in the weaker HL-Russian as compared to SL-Hebrew confirms the link between disfluencies and proficiency in both BI-ASD and BI-TLD groups. Following previous findings for monolingual autistic children, filled pauses may function as markers to differentiate ASD and TLD, yet only when the linguistic and cognitive load is high. Furthermore, cross-language comparisons in both groups support the pragmatic nature of disfluencies. Disfluency usage in bilingual autistic children was rather language-universal (i.e., affected by clinical status), rather than language-specific (i.e., affected by language properties), as in case of non-autistic bilingual children. Little variation in the disfluency patterns in autistic children indicates less reliance on the pragmatic advantages that each language offers, for instance, in SL-Hebrew prolongations are allowed rather than filled pauses, but only non-autistic bilingual children implemented this pragmatic advantage of continuity. The use of listener-oriented filled pauses and prolongations may further benefit speaking ability by helping bilingual and monolingual autistic children to hold their conversational turns and to improve their pragmatic skills.

412.166 (Poster) Disrupted Audio-Motor Synchronization of Speech in Autism and First-Degree Relatives.

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Background: The unconscious tendency to align one’s behavior with external stimuli, or spontaneous synchronization, supports many aspects of human cognition and behavior. Especially crucial for social communicative success is synchrony across elements of speech and language. Recent evidence suggests that autistic individuals demonstrate reduced speech prosody synchronization (e.g., rhythm, pitch) with their social partners, which contributes to broader pragmatic language difficulties. Similar patterns have also been observed among their first-degree relatives, suggesting a genetic link. Yet, the neurocognitive basis of such differences, and whether a lack of spontaneous synchronization of speech is evident at a fundamental level in autism (i.e., independent of social contexts) remains unclear.

Synchronization of non-social speech rhythm in the general population is particularly robust, demonstrating a bimodal pattern of variability wherein some people tend to align speech output spontaneously and effectively with external rhythms, while others do not. Such variability is also associated with underlying neural architecture and language-related skills. Studying how such variability in rhythmic synchronization, devoid of social influence, may differ in autistic and broad autistic populations may provide important insights into the genetic and neuro-mechanistic underpinnings of core speech/language difficulties in autism.

Objectives: To examine spontaneous audio-motor synchronization of speech to external rhythms among autistic individuals and their first-degree relatives as a potential mechanism underlying broader speech/language difficulties.

Methods: Participants include 12 autistic individuals (ASD), 15 parents of autistic individuals (ASD-Par), and 7 adult controls (Controls) (data collection is ongoing and a more robust sample is expected at the time of presentation). A separate sample of 271 controls, whose data have been previously published, is also included. The spontaneous speech synchrony (SSS) task was used to assess rhythmic synchronization to an external rhythmic syllable stream. Phase locking values (PLV) between the envelopes of the produced speech and the stimuli characterize the degree of synchrony. A gaussian mixture model, fit to the bimodal distribution of synchrony values from existing data have been previously published, is also included. The spontaneous speech synchrony (SSS) task was used to assess rhythmic synchronization to an external rhythmic syllable stream. Phase locking values (PLV) between the envelopes of the produced speech and the stimuli characterize the degree of synchrony. A gaussian mixture model, fit to the bimodal distribution of synchrony values from existing normative data of typically developing adults, was used to determine the probability of a participant falling in either the “high” or “low” synchrony groups for dichotomization.

Results: A disproportionate number of ASD and ASD-Par participants were classified as low synchronizers at 83% and 73%, respectively, as compared to 40% of Controls ($X^2 = 14.43, p < .001$). The average PLVs of the ASD and ASD-Par groups were not statistically different from one another ($p=.89$), but were both significantly lower than the Control group (PLVs, ASD: .298, ASD-Par: .299, Control: .436, ps<.05).

Conclusions: Results of this study provide compelling early evidence of disruptions in spontaneous rhythmic synchronization of speech in autism in a non-social context. Such mechanistic differences may underlie downstream speech and pragmatic language characteristics, including speech prosody and synchronizing one’s prosody with that of their social partner’s. That this pattern emerged in clinically unaffected parents suggests that it may be influenced by genetic variability associated with autism. Taken together, spontaneous audio-motor synchronization offers an objective, measurable, potential endophenotypic marker of autism, warranting further investigation on its impact on broader clinical and language features.

412.167 (Poster) Do Personal Interests Support Word Learning? a Study with Autistic and Non-Spectrum Children

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Background: Intense interests are often associated with autism, but they are not exclusive to autistic individuals. Up to half of nonspectrum children may have intense personal interests. Despite suggestions that these interests are detrimental across both autistic and non-spectrum children, personal interests in fact seem to support learning of conceptual, factual, and social information. Although it has been noted that intense interests seem to be over-represented in children with strong language skills, few studies have directly addressed the link between personal interests and language learning.

Objectives: We asked whether for children on and off the autism spectrum—learning of new words was more robust when visual stimuli included the personal interest of the child relative to neutral images.

Methods: A Zoom-based study enrolled two groups of children: autistic children (n = 48; mean age 58 months) and non-spectrum children (n = 48; mean age 35 months). Groups did not differ significantly on expressive vocabulary on the MCDI3.

Each child observed two counterbalanced word-learning trials. Trials presented an object/character performing an action (e.g., spinning) and an utterance including a novel word (e.g., “Look, he is kibbing!”). For one trial, the object/character depicted the child’s personal interest (previously determined via caregiver report). In the other trial, the object/character was of neutral interest to the child (per caregiver report).

After each trial, children were tested on their learning of the novel word. Children saw the previous, target action (e.g., spinning) and a different action (e.g., bouncing) side-by-side on the screen. Their gaze was recorded; attention to the target scene when directed to “find kibbing” served as the measure of learning.

Results: Mixed-effects regressions were conducted for each condition within each group with the proportion of looking to the target scene (empirical logit transformed) as the dependent measure. Intercept parameter estimates were evaluated to determine whether children preferred the target scene at above-chance levels. For the autistic group, target preference was above chance in both conditions (neutral \( \beta = 0.52 \), \( p = .014 \); personal interest \( \beta = 0.50 \), \( p = .0086 \)). However, for the non-spectrum group, target preference was only above chance in the neutral condition (\( \beta = 0.53 \), \( p = .0084 \)) (personal interest condition \( \beta = 0.046 \), \( p = .81 \)).

Conclusions: For the non-spectrum children, the incorporation of personal interests resulted in failure to learn a novel word, although they succeeded when stimuli relied on neutral images. These unanticipated results may be due to the conceptual disconnect between the stimuli and the word—that is, the word was not thematically related to the interest. Non-spectrum children may have found this use of their personal interest distracting; future research should explore this possibility.

In contrast, for autistic children, personal interests did not interfere with language learning; invoking these interests resulted in robust mastery of a new word. The critical role of early language for a variety of outcomes indicates the importance of supporting linguistic skills in children with autism; invoking personal interests may be one avenue for supporting this critical skill.

412.168 (Poster) Early Use of Manner and Result Verbs in Autism and Typical Development
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Background:

Substantial heterogeneity exists in language profiles in autism spectrum disorder (ASD; Pickles et al., 2014). One area of language that might help illuminate this heterogeneity is verb production, as childhood verb diversity predicts language outcomes in ASD (LeGrand et al., 2021). However, semantic components of early verb vocabulary in ASD have not been explored. Recent studies reported that late talkers use a higher proportion of result verbs (e.g., break, clean) than manner verbs (e.g., run, dance), while typically developing (TD) toddlers show the opposite pattern (Horvath et al., 2019, 2021). Given the frequent presence of language delay in ASD, children with ASD might also show differences in manner and result production compared with language-matched TD peers.

Objectives:

This study investigates the early production of manner, result, and internal (e.g., believe, listen, pretend) verbs via analysis of naturalistic language samples.

Methods:

44 children (ASD n=22, TD n=22) participated in six parent-child play sessions, each four months apart; ASD and TD groups were initially matched on expressive language (Table 1). Play sessions were transcribed, and verbs were coded as manner, result, or internal. Verbs that did not fall into these categories were excluded for these analyses. Timepoints at which a child produced zero verbs were excluded for that
child. Here, each datapoint represents one child’s verb usage in one of the semantic categories (as a proportion out of total verb types) at one timepoint, yielding 223 datapoints total in each semantic category.

For group difference analysis, datapoints were binned by children’s total verb vocabulary size: 1-10 verbs (75 datapoints in each semantic category), 11-20 verbs (44 datapoints), 21-30 verbs (51 datapoints), 31-40 verbs (35 datapoints), and 41-50 verbs (15 datapoints). Within each bin, the ASD and TD groups were compared on proportion of manner, result, and internal verbs.

We ran two linear mixed effects models, one predicting proportion of manner verbs and the other predicting proportion of result verbs. In both models, verb vocabulary size (continuous), group (ASD and TD), and the interaction between verb vocabulary size and group were random effects, and participant was a fixed effect.

Results:

No significant group differences emerged in any verb vocabulary bin for manner or result proportions (Figure 1a). For internal verb proportion, the groups differed significantly only in verb vocabulary bin 21-30 (p=.008).

Verb vocabulary size significantly predicted manner and result proportions (p<.001), while group did not significantly predict manner proportion (p=.203) or result proportion (p=.826; Figure 1b). The interaction between group and verb vocabulary size was not significant in either model.

Conclusions:

Overall, as verb vocabulary increased, proportion of manner verbs also increased while proportion of result verbs decreased. ASD diagnosis did not affect this pattern. ASD and TD groups produced comparable proportions of internal verbs at most verb vocabulary levels. These results indicate that early verb vocabulary in ASD and TD is similar with respect to these components of lexical semantics. Broadly, these results support the idea that structural language in ASD and TD may be more similar than different.

412.169 (Poster) Evaluating the Social Communication Development of Multilingual Children with Autism: A Medical Record Review Study

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Background: Across the world, there are over 7,100 languages spoken (Ethnologue, 2022). However, to date, most research on language development and human cognition has primarily focused on monolingual, English-speaking children and adults (Blasi et al, 2022; Kidd & Garcia, 2022). This focus also persists in autism research (Sweileh et al., 2016; Zeidan et al., 2022); however, an emerging field of study has centered on multilingual language experiences in children with autism (Valicenti-McDermott et al., 2012; Vanegas, 2019). These studies have shown that there may be some benefits conferred to multilingual children (e.g., gestures, math skills). However, much remains to be known about the early social communication development of multilingual children with autism.

Objectives: This study aims to evaluate and characterize the social communication development of multilingual children with autism.

Methods: The data presented here is part of a larger study that examined the clinical profiles of racially/ethnically and linguistically diverse children with autism. Medical records of children between 3 and 12 years of age who visited a developmental disabilities clinic in a large city in the United States were reviewed. Overall, 340 children with autism were included in the present study (83.8% male, 16.2% female), representing Latino (54.1%), Black/African-American (26.5%), white (16.2%), Asian (1.8%), and multi-racial (1.5%) communities. The sample included children who were minimally verbal (29.7%), monolingual (33.2%), and multilingual (37.1%). Languages spoken within this sample include English, Spanish, Akan (Twi), Arabic, Ashanti, Cantonese, Garifuna, Greek, Hindi, Igbo, Italian, Korean, Polish, Portuguese, Punjabi, Romanian, Slovak, and Urdu. Demographic, cognitive, and adaptive behavior data, along with qualitative descriptions of children’s social communication were extracted from the medical records, written reports, and other clinical assessment measures. Qualitative descriptions were coded to allow for synthesis and analysis.

Results: Preliminary analyses showed that minimally verbal children (M = 3.74, SD = 1.56) received their first autism diagnosis earlier than monolingual (M = 5.29, SD = 2.69) and multilingual (M = 5.24, SD = 2.32) children, p < .001. Multilingual children were more likely to reside in a multilingual household (55.6%) than minimally verbal (27.7%) and monolingual children (2.7%), p < .001. Children’s expressive language was coded into developmental phases (Tager-Flusberg et al., 2009), see Figure 1. No differences in developmental phases emerged between monolingual and multilingual children (all p’s > .05); however, both groups were less likely to be in the preverbal and first words phase than minimally verbal children, p < .001. Multilingual children (87.1%) were more likely to point to objects than minimally verbal (48.7%) and monolingual (64.2%) children, p < .001. Additional analyses will evaluate receptive, expressive, pragmatic, and play-based communication and the role of monolingual and multilingual households on social communication among multilingual children.
Conclusions: This study contributes to our understanding of social communication among children with autism who experience life in multiple languages. Studying large, diverse samples of multilingual children with autism is essential to understanding the intersectionality between language and communication development, culture, and autism. These efforts are critical for addressing inequities in autism research.

412.170 (Poster) Examining Multiple Modalities and Forms of Communication in Minimally Verbal Autistic Children during Parent-Child Interactions
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Background: Social communication is a central feature to the diagnosis of autism spectrum disorder (APA, 2013) and includes verbal and nonverbal behaviors used during social interactions (Anagnostou et al., 2015). The scope of understanding how minimally verbal (MV) autistic individuals are using their communication skills during social interactions remains extremely limited, even though this group comprises one-third of diagnosed autistic individuals (Kasari et al., 2013). Prior work has focused on their difficulties in speech production; however, social communication extends beyond speech (Wetherby et al., 2007; La Valle et al., 2021). The proposed study employs a strengths-based approach to examine how MV autistic children are using multiple modalities and forms of communication and in what ways this influences the parent-child interaction.

Objectives:
- Examine how the child’s modality and form of communication influences parent responsivity.
- Explore whether the parent’s modality of response matches the child’s modality of communication.

Methods: Natural language samples (NLSs) of remote parent-child interactions were collected. NLSs of 20 MV autistic children (Mage=83.90 mo., 13 males) were analyzed using SALT software (Miller et al., 2011). MV was defined as using 20 different spontaneous words in a 15-minute sample (Butler et al., 2022). Families were recruited through the SPARK match registry. Child communication modality (La Valle et al., 2020; Özçalışkan et al., 2016): gesture, speech, gesture+speech combinations, and AAC. Child communication form: precise forms included: reach/point gestures, intelligible speech, and supplementary gesture+speech combinations (gesture contributes additional information to the speech); imprecise forms included: reach/point approximations, partially intelligible speech, and other gesture+speech combinations (unintelligible speech accompanied by a gesture). Parent response type: contingent-parent verbal or nonverbal response is related to the child’s social communication; non-contingent-unrelated to the child’s social communication; and no response (Choi et al., 2020). Parent responses that are contingently related to the child’s communication can support language development (Tamis-LeMonda et al., 2014). Parent response was coded in the two utterances immediately following the child’s social communication. Parent modality of response: gesture, speech, gesture+speech, and AAC.

Results:
For gesture, speech, gesture+speech, and AAC modalities, of the 20 participants, 15% used four modalities, 45% used three modalities, 30% used two modalities, and only 10% used one modality of communication. 1) The highest proportion of contingent parent responding occurred for child-initiated gesture+speech combinations (Fig.1A). Child gesture+speech combinations was related to more contingent responses (r=.871, p=.001). The proportion of contingent and non-contingent responses did not differ by form (z=-.40, .16, p=.690, .867; Fig.1B). 2) Across the child’s modalities of communication, parents most frequently responded using speech (Fig.2A-2D).

Conclusions: MV autistic children are using multiple modalities and forms of communication during the parent-child interaction. The incorporation of gesture which adds semantic information to the speech assists in augmenting parent responsivity; however, the precision of the child’s communication form does not influence how the parent responds. Findings highlight the importance of focusing on their communicative strengths and extending beyond only aspects of speech to consider multiple modalities of communication to obtain a more comprehensive understanding of their social communication abilities.

412.171 (Poster) Examining the Implementation Feasibility and Adherence of LENA Technology in a Multi-Site Sample of Toddlers with Social Communication Delays and/or ASD
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 outliers were excluded from the analysis. LENA recordings were analyzed using the LENA software. Results: A total of 61 toddlers (Mage=24 months, 30 males) were included in the analysis. The LENA recordings were made in the child’s home environment, and the recordings were transcribed and analyzed. The findings showed that toddlers with social communication delays and/or ASD had lower levels of speech and activity levels compared to typical toddlers. Conclusions: This study highlights the importance of using LENA technology to assess social communication in toddlers with social communication delays and/or ASD.

Results:
The LENA recordings were analyzed using the LENA software. Results: A total of 61 toddlers (Mage=24 months, 30 males) were included in the analysis. The LENA recordings were made in the child’s home environment, and the recordings were transcribed and analyzed. The findings showed that toddlers with social communication delays and/or ASD had lower levels of speech and activity levels compared to typical toddlers. Conclusions: This study highlights the importance of using LENA technology to assess social communication in toddlers with social communication delays and/or ASD.

Conclusions: This study contributes to our understanding of social communication among children with autism who experience life in multiple languages. Studying large, diverse samples of multilingual children with autism is essential to understanding the intersectionality between language and communication development, culture, and autism. These efforts are critical for addressing inequities in autism research.
Background: Families of children with social communication delays and/or suspected autism spectrum disorder (ASD) often struggle to navigate barriers associated with standardized assessment and early intervention services (e.g., waitlists, costs,) (Bivarchi et al., 2021). The Language ENvironment Analysis (LENA) System is a wearable audio-recorder that captures linguistic input and output within the home (Dykstra et al., 2012). Previous literature has demonstrated this technology’s feasibility among preschoolers with suspected ASD; however, few to none have reported comprehensive demographic data that demonstrates accessibility across an ethnorracial, socioeconomic, and linguistically diverse sample (Sulek et al., 2020; Pawar et al., 2017). In this abstract, we examine the feasibility and adherence of LENA technology across a multisite, community-based sample, which is not replicated by other literature.

Objectives: Our aim was to outline potential barriers, if any, that exist in navigating LENA, a supplemental and naturalistic insight into the child’s linguistic environment. To demonstrate adherence to LENA technology among participants of various identities, we examined demographic data across those who completed and didn’t complete LENA procedures.

Methods: Data collection and coding are ongoing (to date, n=49, 9 girls, age 25 to 60 months) with an anticipated sample of n=85. All participants filled out the demographics form in either English or Spanish. Approximately three-quarters of families provided LENA data. Moreover, no specific demographic characteristics significantly deterred families from accessing the materials and procedures. This demonstrates general adherence to LENA technology in a cross-site community-based sample. Future directions include assessing LENA data as a supplement or even substitution for standard assessment of language ability to increase evaluation accessibility among families.

Results: Chi-squared analyses were run to determine any significant demographic differences between those who completed LENA and those who did not. Neither race (χ²=1.88, p=.171) nor ethnicity (χ²=4.050, p=.132) were significantly related to LENA protocol completion. Similarly, LENA adherence was no different among families below the poverty line (χ²=1.25, p=.263) or below the sample's median income (χ²=0.39, p=.844). Lastly, an independent sample t-test was run to determine whether child age had a significant effect on LENA completion, which yielded no significant differences between groups, with t(77)=-1.471, p=.263, d=-.375.

Conclusions: These results support current literature on the feasibility of remote LENA implementation with toddlers with social communication delays and/or ASD in a diverse sample living in urban and rural regions in the USA. Findings suggest good engagement as approximately three-quarters of families provided LENA data. Moreover, no specific demographic characteristics significantly deterred families from accessing the materials and procedures. This demonstrates general adherence to LENA technology in a cross-site community-based sample. Future directions include assessing LENA data as a supplement or even substitution for standard assessment of language ability to increase evaluation accessibility among families.


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Background: The Brief Observation of Social Communication Change (BOSCC) was designed as an observational instrument with fine-grained scoring that is sensitive to the level of autism features during parent-child interactions (Grzadzinski et al., 2016). Executive functioning has been linked to the expression of autism features in older children but has received relatively little research attention among toddlers and preschoolers.

Objectives: This study aims to examine whether social communication and repetitive behavioral features of autism are related to concurrent language, cognitive skills, and executive functioning between the ages of 2 and 4 years.

Methods: Data collection and coding are ongoing (to date, n = 49, 9 girls, age 25 to 60 months) with an anticipated sample of n=85. All children were diagnosed with an autism spectrum disorder, which was confirmed via the ADOS-2 and ADI-R. Verbal and nonverbal developmental quotients were computed from Mullen scores. During the parent-child interaction (PCI), children and one of their parents played freely with a variety of toys and were recorded for 10 minutes. BOSCC ratings were applied to yield total, social communication delays and/or ASD in a diverse sample living in urban and rural regions in the USA. Findings suggest good engagement as approximately three-quarters of families provided LENA data. Moreover, no specific demographic characteristics significantly deterred families from accessing the materials and procedures. This demonstrates general adherence to LENA technology in a cross-site community-based sample. Future directions include assessing LENA data as a supplement or even substitution for standard assessment of language ability to increase evaluation accessibility among families.

Results: We first examined concurrent predictors of overall BOSCC scores. Nonverbal developmental quotient (p=.001), verbal developmental quotient (p<.001), and set shifting (p=.066) correlated with overall BOSCC scores. In the full regression model, language significantly predicted BOSCC levels (β=-.43, p=.01). Next, we examined the BOSCC SC subdomain and found significant correlations
with nonverbal developmental quotient ($p=.003$), verbal developmental quotient ($p<.001$), and working memory ($p=.03$). In the full regression model, language ($β=-.56, p=.003$) and working memory ($β=-.36, p=.04$) significantly predicted BOSCC social levels. Finally, we examined the BOSCC RRB subdomain and found significant correlations with nonverbal ($p=.02$) and verbal ($p=.01$) developmental quotients. In the full regression model, neither nonverbal ($β=-.20, p=.27$) nor verbal ($β=-.24, p=.18$) developmental quotient significantly predicted the BOSCC RRB.

Conclusions: Our preliminary results suggest that features of autism expressed while playing with a familiar person are predicted by language, cognition, and executive function. Interestingly, overall features were predicted by language ability, whereas social features were predicted by both language and working memory ability. Although repetitive features correlated with nonverbal and verbal developmental level, these abilities appear to account for shared variance in predicting RRB features. These initial findings suggest that assessing – and potentially targeting with intervention – language, cognition, and executive function may support the functioning of autistic toddlers and preschoolers.

**412.173 (Poster) Experiences of Individuals with Autism in Communicating with Others with and without Autism**

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Background: Having social interaction difficulties is one of the main criteria for the diagnosis of autism. However, according to the double empathy theory (Milton, 2012), these social interaction difficulties do not only stem from the individual with autism, but are rather due to a mismatch between neurologically different interaction partners. This would mean that in addition to individuals with autism finding it difficult to interact with neurotypical individuals, neurotypical individuals also find it difficult to communicate with and interpret the behavior of individuals with autism. According to the theory, individuals with autism are also expected to find it easier to communicate with other individuals with autism. The research on this topic is however limited and mainly based on anecdotal evidence.

Objectives: The goal of this study is to gain insight into the experiences of a large sample of adults with autism of their communication with adults with and without autism.

Methods: An online questionnaire was constructed and distributed through different social media channels. 415 individuals with an autism diagnosis from Belgium and the Netherlands filled out the questionnaire. The participants consisted of 100 male participants, 302 female participants, 5 non-binary participants, 2 trans male participants and 6 participants who preferred not to disclose their gender with ages ranging from 18 to 75 years and a mean age of 40. The questionnaire consisted of demographic questions, 14 closed questions, in which they directly compared the communication of adults with and without autism and 6 open-ended questions where they were asked to mention a particular person with or without autism they know, and what makes interaction more difficult or easier with that person.

Results: The closed questions were analyzed using two proportion z-tests and ordinal logistic regression. Overall, answers on the closed questions revealed that adults with autism find it significantly easier to communicate with other individuals with autism compared to neurotypical individuals on different communication domains. This was the case for preference to communicate and being more inclined to communicate with someone with autism but also feeling better understood, better able to understand and estimate someone’s thoughts and feelings, being at ease and being themselves, having to camouflage less, being less tired during and after communication and finding it easier to interpret unspoken rules when their interaction partner also had autism. For body language however, there was no significant difference in the ease with which they could understand the body language of individuals with or without autism. The results of the open-ended questions supported our findings from the closed questions and revealed various interesting themes on the differences in communication between individuals with and without autism. For example, many individuals with autism indicated they camouflage a lot less when they know they interact with another individual with autism.

Conclusions: Our findings indicate that adults with autism experience verbal communication to be easier with other adults with autism than with adults without autism.

**412.174 (Poster) Exploring Interactions in Inclusion Classrooms: The Case of Vicarious Accounts**

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Background: Autistic students are often on the periphery of social networks (Locke et al., 2010). Traditional views of autism draw causal connections between autistic children’s social-communicative repertoires and their social inclusion. However, contemporary research has explored the role of non-autistic people in interaction, including how they construe mundane characteristics (e.g., appearance) as evidence that autistic people are less suitable social partners than non-autistic people (Sasson et al., 2017). These interpretations may negatively impact autistic people's social opportunities. In this study, we focus on how non-autistic social partners— such as paraprofessionals and classmates— make sense of autistic students’ social conduct in classroom interactions. Autistic students are often assigned paraprofessionals to assist with academics and facilitate peer interactions. However, it is not clear that paraprofessional support actually improves autistic children's social opportunities; instead, they may inadvertently deflect peer engagement (Giandreco et al., 2010).
In this conversation analytic (CA) study, we describe how paraprofessionals are involved in interactions between autistic students and non-autistic classmates. CA is a sociolinguistic method for analyzing social conduct, which assumes interactive moves are sequentially and contextually embedded. Social behavior can be systematically analyzed to determine how interlocutors co-construct interactions. One type of social action that featured prominently in our dataset is accounts, which are provided to address unanticipated behavior (Scott & Lyman, 1968). Rejections, departures from routines, or violations of preference organization are often preceded or followed by accounts (Raevaara, 2011).

Objectives: To explore how accounts are made relevant to classroom interactions, and the interactional consequences of those accounts.

Methods: Teachers, paraprofessionals, and students from three elementary classrooms participated. Classrooms were video-recorded three times, for thirty minutes each session. Participants’ talk and non-verbal conduct were transcribed using (CA) conventions (Jefferson, 2004). We selected transcripts of small-group activities that included autistic students (n = 4; 3 female; 3 White, 1 Hispanic), a paraprofessional (n = 4 White females), and non-autistic classmates (n = 7; 6 female; 3 White, 3 Hispanic), and analyzed them on a turn-by-turn basis.

Results: 66% of all identified accounts were provided to explain autistic students’ conduct, and 44% of these accounts were provided vicariously; that is, by someone other than autistic students. Vicarious accounts are unusual in CA research on non-disabled adults, as interlocutors generally avoid claiming epistemic authority over others’ conduct (Heritage & Raymond, 2005). Vicarious accounts have interactional consequences because they are often provided to a third party (e.g., non-autistic classmates). This shifts participation frameworks so the person whose behavior is deemed accountable becomes the topic of talk, rather than a participant in talk (Goffman, 1981). Interestingly, paraprofessionals provided accounts for autistic students’ mundane social actions—such as cutting paper, retrieving materials, or describing events with unexpected specificity—that were not discernible as threatening intersubjectivity.

Conclusions: Because autistic children’s behavior can depart from normative expectations, vicarious accounts are an informative phenomenon for understanding how perceived deviations are made relevant to interaction, and how construing mundane behavior as accountable can position autistic students as outsiders to interaction. Our findings have relevance for paraprofessional training.

412.175 (Poster) Expressive Communication in Naturalistic Conversations: Objective at-Home Assessment of Lexical Maturity, Morphosyntactic Complexity, and Talkativeness in Autism


Background:

Challenges in social communication and interaction are a core symptom domain in autism. Novel therapies are under development to help individuals with these challenges. However, standardized measures often lack the sensitivity to detect subtle improvements in communication ability over time, and are both expensive to administer and reliant on human judgment. Expressive Language Sampling (ELS) through structured conversations has emerged as a promising way to measure expressive communication abilities (ECA) in autism. ELS is typically performed in a clinical setting with a trained conversation partner or physician. Here, we examine naturalistic conversations with family members in home settings that may be more representative of everyday speech.

Objectives:

Quantify ECA in autistic individuals using transcriptions of natural conversations recorded at home. Assess relationships between morphosyntactic complexity, lexical maturity, and talkativeness, and establish convergent validity with clinical anchors.

Methods:

90 autistic and 45 neurotypical NT individuals between the ages of 5 and 45 participated in a non-drug observational study (NCT03611075). Participants were asked to record a 5-minute conversation at home with a conversation partner once per week over a 12-week period. Manual transcriptions were obtained for 51 autistic and 19 participants. A neural network pipeline from STANZA1 was applied to transcriptions from 385 conversations to classify part-of-speech (PoS) tags. Morphosyntactic complexity was assessed through relative usage of PoS classes. Lexical maturity was quantified by calculating the average Age of Acquisition (AoA) using previously
published ratings. Finally, total words spoken was used as a measure of talkativeness. Clinical anchors were the Expressive Communication subscale of the Vineland Adaptive Behavior Scale (VABS) and the verbal component of the Stanford-Binet Intelligence scales abbreviated battery IQ (SB5 ABIQ-verbal). Convergent validity of the quantitative features was tested using Pearson’s R against clinical scales.

**Results:**

For all three measures of ECA, we identified features showing convergent validity against one or both clinical scales. Average AoA of words from the most common PoS classes (nouns, verbs, adverbs, adjectives) was significantly correlated with verbal IQ. Relative usages of PoS classes on the other hand, were significantly correlated with both verbal IQ and expressive communication where higher abilities were associated with increased adverb and reduced noun usage. Total words spoken per conversation were associated with both anchors, although inspection of the scatterplots indicates that this likely reflects greater talkativeness in participants with higher communication and verbal abilities. Finally, for all aforementioned features, we found a clear separation between NT and autistic participants with lower ECA but failed to distinguish between NT and autistic participants with higher ECA.

**Conclusions:**

It is feasible to quantify various aspects of ECA from dyadic conversations recorded by autistic individuals and their study partners at home. In this study, we showed that key lexical features gathered using ELS methodology correlate significantly with established measures of language and communication (parent report and direct assessment). ELS carries great potential as a method to monitor subtle changes in social communication behavior during clinical trials.

2. Kuperman V., DOI:10.3758/s13428-012-0210-4

**412.176 (Poster) Extraction and Analysis of Acoustic Features from Italian-Speaking Children with Autism Spectrum Disorder**

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**Background:** The persistent difficulties in social interaction and communication that characterize Autism Spectrum Disorder can be accessed by investigating the quality of language. Indeed, these deficits involve the presence of anomalies in speech production and understanding, which find an expression at the acoustic and prosodic levels of linguistic analysis.

**Objectives:** The main aim of this work is to propose a speech pipeline for the extraction of Italian speech biomarkers typical of ASD by conducting an acoustic and phonological analysis. Moreover, we will highlight the strengths and difficulties of this kind of investigation introducing new topics for further research.

**Methods:** The poster will present the analysis of a speech corpus of 14 Italian-speaking children with ASD and 14 controls (C). The corpus is demographically balanced (age 6-10, 8;1 ± 1;3. Sex: 3F, 11 M) and homogeneous at the diatopic level (origin: Prato, Pistoia, Florence).

First, we extracted the acoustic features by using eGeMAPS (openSMILE; Eyben et al., 2015), specifically ideated for the study of impaired speech. Then, we implemented the Mann-Whitney U-test to select the features with the most statistically significant distance in the production of the two groups.

Secondly, we conducted a parallel extraction regarding the pitch (F0 mean and standard deviation). We propose this additional analysis because pitch varies according to some demographic traits of the speaker (sex, age, height) and the literature presents opposite trends. For this task, we used Praat to have more flexibility in the manipulation of the extraction. We set the F0 range between 70 and 400 Hz (Patel et al., 2020).

Finally, we conducted a comparison between the results of the two methods excluding female participants to verify if the trend of pitch changes when the participants are not mixed.

**Results:** Table 1 shows the features selected between the ones extracted. They are related to prosody, quality of voice, loudness, and spectral distribution.

Jitter, shimmer and HNR are usually investigated together to describe the emotional prosody and the quality of voice. The same trend found on our corpus is recorded in previous studies on languages other than Italian (Bone et al. 2015; Kissine & Geelhand 2019). Moreover, spectral flux is usually investigated together with shimmer and jitter to describe speech impairments (Haider et al., 2019). Nevertheless, if we consider the studies related to autistic speech, there are few that describe this feature because of the different methodologies used during the extraction.
Finally, the values of pitch extracted by eGeMAPS and Praat show the same trend. It is higher in ASD than in controls, both if we considered the corpus mixed and the one with only the male speakers. However, the pitch does not show a statistically significant difference between the two groups (Table 2).

Conclusions: These results, although preliminary, seem to confirm the presence of phonetic alterations of speech associated with the disorder. Further studies could improve the accuracy of the pipeline proposed by doing a qualitative analysis of the results and considering other linguistic and paralinguistic domains (e.g., morphological, pragmatic, and gestural analysis).

412.177 (Poster) Facial Expression Production in Young Children with ASD

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Background:

Children with Autism Spectrum Disorder (ASD) have difficulties in social communication that include, among other symptoms, qualitative and quantitative impairments in producing facial expressions. Previous studies have reported that individuals with ASD display fewer facial expressions that often look odd/atypical and are not directed at others, in contrast to typically developing controls. These studies have mostly relied on manual coding of video recordings of individuals with ASD interacting in natural or artificial situations.

Objectives: To examine whether children with ASD differ from children with typical development (TD) in their production of facial expressions as captured in video recordings from Autism Diagnostic Observation Schedule, 2nd edition (ADOS-2) assessments, and analyzed using automated facial analysis software.

Methods:

We examined video recordings from 20 children with ASD and 8 children with TD ages 3-8 years old who completed assessments using modules 2 or 3 of the ADOS-2. These modules include tasks that require the child to sit at a table, making their face more clearly visible to a stationary camera. All children with ASD and none of the TD children reached the ADOS-2 cut-off for ASD. Video recordings were then analyzed using Py-feat software that detects the movement of different facial muscles (i.e., action units) and a pre-trained algorithm that identifies the presence of specific facial expressions (e.g., happiness, anger, surprise, etc...) on individual frames.

Results:

Happiness was the most dominant expression across children, which was present in .07-.08 percent of video frames in the ASD and TD groups respectively (other expressions were rare and were not analyzed). Groups did not differ in the frequency or duration of smiles. However, significant differences were apparent in the quality of smiles across groups. This was apparent in significantly stronger activation of several AUs including the inner brow raise, jaw drop and eye widening. We further analyzed smile quality by representing each smile as a vector of the activated AU and then measuring the Euclidian distance between smile vectors of individuals in the two groups. Smiles of individual children with ASD differed from the average of their group significantly more than smiles of individual TD children (ASD: mean=.49, sd=.15, TD: mean=.3, sd=.05, p>.005), demonstrating that children with ASD smile in an idiosyncratic, activating different sets of AUs.

Conclusions:

These findings suggest that when assessing facial expressions during social interaction with an adult, children with ASD tend to produce smiles that look different from those of TD children and are more unique and idiosyncratic compared to TD controls. These results indicate the importance of examining not only the presence of facial expressions but also their shape (i.e., pattern of activated facial muscles) to quantify and examine the “uniqueness” of expressions in young children with ASD.

412.178 (Poster) Factors Affecting Parental Concerns: Evidence from India

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Background:

Health care systems in many Low- and Middle-Income Countries (LMICs) require parents to fund and advocate for their autistic children’s developmental needs; for example, behavioral interventions are out-of-pocket expenses for those living in India. Levels of parental
concerns drive parents’ advocacy efforts and shape child development. Parental factors like childrearing supports and child abilities, such as communication skills, may influence parental concerns, which in turn rely on families’ cultural backgrounds. Current data on parental concerns emerge from a Western context. Without an understanding of the factors affecting parental concerns in LMICs, research aimed at supporting children and their families might have limited applicability.

Objectives:

We examined (1) if parental concerns about various aspects of their children’s behavior were related to parent factors like childrearing supports and (2) children’s communication skills affected this relationship within the context of India.

Methods:

This survey data is part of a larger mixed-methods study aimed at understanding parent perspectives on early intervention and quality of life. Eighty-two parents of children with Autism Spectrum Disorders (aged 3 to 8 years) rated their concerns over their child’s communication abilities, behavioral meltdowns, social skills, and self-injurious behaviors using a scale ranging from 0 to 100. Parents also provided information regarding their marital status, childrearing supports, employment, education, and household income (parent factors). Parent-reported child communication abilities were categorized into those relying on non-verbal or single-word communication (minimally verbal; \( n=47 \)) and those producing at least phrase-level speech (verbal; \( n=35 \)). Correlations were drawn using the Spearman’s rho correlation, as the data were ordinal and continuous. Due to the exploratory nature of the study, we do not correct for multiple comparisons.

Results:

In an exploratory analysis, first we investigated if parental concerns could be treated as a unified construct. Using correlation matrices, we found that different aspects of parental concerns were indeed positively correlated (Table 1). In our second step, we examined the associations of parental concerns as a whole with parent factors (Table 2). Parental concern held a significant moderate positive correlation with childrearing supports, \( r=.258, p=.019 \). Parents’ employment, education, household income, and marital status did not significantly correlate with parental concerns. Childrearing supports did not significantly correlate with parental concerns among parents of children who were minimally verbal, but held a significant high positive correlation with parental concerns, \( r=.466, p=.005 \) (Table 2).

Conclusions:

The findings suggest that childrearing supports substantially influence parental concerns; however, the relation varies based on parent-reported child communication abilities. Surprisingly, parents receiving childrearing supports were more concerned about their children’s behavior. Possibly, type of childrearing supports may influence levels of parenting concerns. For example, some childrearing supports may provide respite and allow parents to notice more areas of concerns in their children. Future confirmatory research should examine types of childrearing supports and their impact on parent and child variables, including communication skills in India and other LMIC contexts. Further, we also need research examining the lack of association between parental concerns and parent factors and the role of culture in this relationship.

412.179 (Poster) Both Children with and without Autism Commonly Align Their Language with That of Their Caregivers

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Background: Linguistic repetitions are a controversial topic in Autism Spectrum Disorder (ASD). ASD has long been associated with echolalia, the persistent repetition of one’s interlocutor’s utterances. The literature on echolalia suggests that children with ASD repeat a lot, without there being a communicative or language-learning purpose. At the same time, research on linguistic repetitions in typically developing (TD) children and adults is increasingly showing that repeating is a skillful social activity, and it helps create shared engagement, common ground and even scaffold language acquisition. Depending on which literature is accessed, children with ASD might be expected to repeat more or less than typically developing ones.

Objectives: We take a systematic and nuanced stance on linguistic repetitions in children with and without ASD: we distinguish exact repetition, rate, and level, as well as lexical, syntactic, and semantic repetitions in a large quasi-naturalistic corpus.

Methods: We analyzed spontaneous speech in 67 parent-child dyads from a longitudinal corpus (30 minutes of play activities, 6 visits over 2 years). We included 32 children diagnosed with ASD and 35 linguistically matched TD children (mean age at recruitment respectively 32.76 and 20.27 months). Alignment was calculated using the ALIGN Python library (Duran et al., 2019). We first contrasted child alignment in actual conversations with that in surrogate pairs formed by a parent and a child from two different dyads. We used Bayesian multilevel zero-and-one-inflated beta regression models. This accounts for the propensity of children to align at all (rate), the proportion of the caregiver’s utterance repeated when the children actually align (level), and exact repetitions, as a function of diagnostic group and visit.
Control analyses adjust for Vineland Socialization (VS), Mullen Expressive Language (MEL) and Visual Reception (MVR). Lexical repetitions were regressed out from syntactic and semantic repetitions to minimize confounds.

Results: We found a small number of exact repetitions in both groups (roughly 1% of utterances); moreover, children with ASD increased their use of repetitions over time (at final visit, 1.2% in ASD vs. 0.7% in TD). Partial repetitions were much more frequent: children reused caregivers’ words at high rates regardless of diagnostic group (24% of utterances at first visit). Partial repetitions of words increased in frequency (but not level) over time, and did so faster for TD children (at final visit: 33% for ASD and 40% for TD); and the same happened for partial repetition of syntax (from 20% of utterances at first visit to 23% for ASD and 43% for TD at last visit) and semantic alignment (from 0.34 semantic similarity at first visit to 0.37 for ASD and 0.44 for TD at last visit). See figure below.

Conclusions: Children with and without ASD commonly re-used the words, syntax and topics of their caregivers. However, they did so in a productive way: building new utterances on partial repetitions only (as qualitative analyses reveal). Interestingly, children with ASD developed this skill at a slower rate than those without, contrary to previous findings using less fine-grained methods.

412.180 (Poster) Autistic Children Are Faster at Turn-Taking, More Strongly Driven By Their Own Tempo, and Less Coordinated with Their Interlocutor Than Neurotypical Controls


Background: Turn-taking during communication is a near-universal phenomenon that requires tight coordination between interlocutors, and functions as a key driver of perceived interaction quality (NguyenEtAl2021). A number of studies have found delayed turn-taking in autistic individuals (i.e., longer response latencies) relative to neurotypical (NT) controls, but results are surprisingly heterogeneous. More importantly, it remains unclear whether atypical latencies can be attributed to: (1) basic linguistic factors, (2) autism-related socio-cognitive impairments, or (3) an altered pattern of reciprocal online adjustments during natural conversation.

Objectives: Assess whether autistic children present slower or faster turn-taking latencies compared with NT peers during telephone-based voice sample collection, and whether this might be due to atypical dynamics of interpersonal adjustment between interlocutors.

Methods: 18 autistic children (5 females; mean age=9.33±2.4 years; mean IQ=115±16; 62 recordings) and 16 NT NT children (11 females; mean age=9.75±2.84 years; mean IQ=116±12; 61 recordings) children, matched on age (p=0.65), and IQ (p=0.85), participated in 3 brief telephone-based conversations about birthday party planning with a research assistant and played a face-to-face matching game with their parents three times (N.B., longitudinal data collection from 7 sessions for 48 participants will be reported in May 2023). Response latencies were modeled following an ex-gaussian distribution (LindsayEtAl2019), while interpersonal adjustment was modeled using dyadic coupling (FerrerEtAl2013), which separates self-regulation (the tendency to maintain one’s specific average response latency, so that a longer latency is followed by a shorter one and vice versa) and adjustment (the tendency to follow the interlocutor’s previous response latency).

Results: Autistic participants responded slightly faster than NT controls across tasks (e.g. during a Matching game, autistic: 1180ms, 95%CI 473ms-1887ms; NT 1350ms, 761ms-1989ms, evidence ratio for the difference (ER): 4). Adult interlocutors of autistic children also responded more quickly (autistic: 930ms, 95%CI 210ms-1620ms; NT: 1160ms, 620ms-1660ms; difference: 230ms, -40ms-570ms, ER=4).

Autistic participants had a higher tendency to self-regulate (negative autocorrelation of successive response latencies): -0.09, 95%CI -0.15--0.03, ER=44, Fig1A; and a lower tendency to adjust to others than NT participants: -0.07, 95%CI -0.14-0.02, ER=11, Fig1B. Adult interlocutors of autistic participants had a higher tendency to self-regulate: -0.03 95%CI -0.1-0.03, ER=4.84, Fig1C. Adult interlocutors displayed a weak tendency to compensate for their partner’s tempo regardless of their diagnostic group (difference: -0.02 95%CI -0.12-0.09, ER=1.49, Fig1D): faster response latencies were responded to more slowly and vice versa.

Conclusions: In contrast to prior research, autistic participants and their interlocutors displayed slightly faster turn-taking. Their response latencies were more driven by the individual’s baseline tempo, and showed less adjustment to their interlocutor. Crucially, the results hold across familiar and unfamiliar interlocutors, telephone and face-to-face conversations.


Nguyen et al. (2021). A systematic review and Bayesian meta-analysis of the development of turn taking in adult-child vocal interactions. Child Development

412.181 (Poster) Natural and Unexpected Bilingualism in Autism
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Background: It has been suggested that around 62.5% of children with ASD demonstrate unusual islet of abilities or “splinter skills” which represent relative strengths compared to peers with typical development (Zhukova. Talantseva, & Grigorenko, 2021). There is evidence of several cases of independent and spontaneous acquisition of languages among individuals with ASD (Smith & Tsimili, 1995). Recently, a case study of an eleven-year-old boy who spontaneously acquired English was described in the literature (Zhukova et al., 2021). Unlike other bilingual children who acquire their second language via interaction with close family members, this group of children accomplishes second-language learning independently and spontaneously.

Objectives: The current study investigated language and Theory of Mind (ToM) abilities in autistic children who acquire their languages via naturalistic input and those autistic children who show ‘unexpected bilingualism’, in which one language is learned via non-interactive sources such as the Internet and/or TV.

Methods: In the current study, forty English-Hebrew-speaking children (aged 4-10) participated: 8 autistic children who learned English via the Internet, 12 autistic children and 20 children without ASD for whom English was the home language. Detailed background questionnaires were administered to all children in the study. Verbal and non-verbal ToM skills were measured via a battery of tasks. Morpho-syntactic skills were measured using LITMUS Sentence repetition tasks (Marinis & Amron-Lotem, 2015). All children were tested twice (once in Hebrew and once in English). Children and parents were interviewed regarding the mode of acquisition and language preferences. Additionally, children were assessed using ADOS-2 (Lord & Rutter, 2012) to re-establish their diagnosis and to evaluate their severity of autism.

Results: A large variation in performance was observed across all the groups, yet no significant differences were found between the groups on any of the measures.

Conclusions: The findings of current study show that bilingualism does not impede language and cognitive development in autistic children. Thus, parents of bilingual children should be advised to maintain dual language exposure for their children. Furthermore, we show that paths to language acquisition can be different: children can acquire their two languages via interactive input at home and in educational settings (as in the case of natural bilinguals with and without autism) and via non-interactive media (as is the case for autistic children who acquired English via Internet).

430.031 (Poster) Formal Language and Non-Verbal Intellectual Skills in Autistic Adults: Exploring Profiles across the Spectrum
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Background: While many autistic children have difficulties with formal language, notably phonology (sound structure) and morphosyntax (sentence structure) (LeGrand et al., 2021), linguistic outcomes vary greatly across children, and some variability has also been reported for autistic adults (Magiati et al., 2014). However, studies on adults are limited and suffer from methodological and sampling shortcomings. Language tasks are generally ill-adapted to the autistic population (due to pragmatic/memory demands), including adults, and individuals with language impairment (LI), as well as those with Developmental Intellectual Disorder (DID), are rarely integrated into experimental cohorts (Girolamo & Rice 2022). Consequently, there is a lack of understanding of formal language abilities and the interplay between linguistic and non-linguistic intellectual skills in autistic adults. While heterogeneous and homogeneous profiles have been attested in autistic children (Silleresi et al., 2020; see also ICD-11, WHO 2019), research is needed to determine which and how many profiles can be identified in adults (Bradshaw et al., 2020).
Objectives: Our study meant to fill this gap by using a sentence repetition (SR) task and a nonword repetition (NWR) task specifically designed to ensure controlled assessment of morphosyntax and phonology respectively. These tasks, LITMUS-SR-FR-Adults (Tuller et al., 2021) and the adult module of LITMUS-NWR-QU-FR-Adults (Ferré et al., 2022), were built after child repetition tasks that have proven to be efficient for identifying LI in autistic children (Silleresi et al., 2020).

Methods: The repetition tasks were administered to 41 French-speaking autistic adults (ages 18-56, M=30.7), half of whom had been diagnosed in adulthood, either with (14/41) or without DID, and to 41 age-matched controls. Receptive vocabulary, working memory (WM), and nonverbal IQ (NVIQ) were also assessed. Information about autism severity was gathered via the SRS-2 (Constantino & Gruber, 2012).

Results: Results on morphosyntax and phonology showed greater variability in autistic individuals (Interquartile Range (IQR) = 24.9 and 25.3 respectively) compared to controls (IQR = 4.5 and 8.3) (Figure 1). Although performance on SR and NWR correlated significantly with WM and NVIQ, the strongest correlations were found across language variables (SR, NWR, and vocabulary). After controlling for language variables, correlations with WM and NVIQ were no longer significant. A K-means cluster analysis performed on nonverbal abilities and formal language revealed two profiles (Figure 2), with mainly homogeneous results (i.e., nonverbal and language scores either both high/average or both low). Only four individuals, at the edge of the clusters, showed more incongruent profiles. No significant difference was found between the clusters for autism severity. Finally, additional analyses conducted separately for morphosyntax and phonology yielded similar clusters.

Conclusions: SR and NWR tasks informed by linguistic theory are robust measures of formal language abilities allowing for exploration of cognitive profiles across the spectrum. Profiles in adulthood seem mostly homogeneous, in line with the hypotheses of ability alignment (Howlin et al., 2014; Simonoff et al., 2020). Further testing currently underway and subtype validation strategies (van Rentergem et al., 2021) should reveal whether incongruent profiles remain infrequent. Importantly, language difficulties appear to be unrelated to autism severity.

430.032 (Poster) From Noun Bias to Verb Bias: Similar Word Learning Processes Among Mandarin-Exposed Children with and without ASD
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Background: Novel word-learning studies revealed that English-exposed preschoolers with autism spectrum disorder (ASD) observe the universal noun bias principle, i.e., by mapping a novel word onto the novel object, when novel actions and objects are presented together (Swensen et al., 2007). Mandarin Chinese, a verb-friendly language, differs from English by allowing pervasive drops of noun arguments. Conflicting findings exist about whether Mandarin-exposed typically-developing (TD) toddlers adopt a noun bias or verb bias in word learning (Tardif 1996; Waxman et al., 2013), while few studies have investigated how children with ASD learn novel words in a verb-friendly language.

Objectives: To investigate whether word learning processes in Mandarin-exposed children with and without ASD are guided by universal principles of human language or/and by specific features of the target language.

Methods: Utilizing the Intermodal Preferential Looking paradigm (Naigles & Tovar, 2012), we investigated word learning processes in 39 20-29-month-old TD toddlers and 46 36-69-month-old preschoolers with ASD exposed to Mandarin. To evaluate possible developmental trend, the participants were divided into subgroups by a median split of age (Table 1). The two ASD subgroups had more autistic behaviors than the two TD groups (ps < .001), while the two TD groups had higher expressive language levels than the two ASD groups (ps < .001 between the TD/older and the ASD subgroups). Novel actions and objects were presented in side-by-side videos, and the child was tested whether she would map a novel word onto an object or an action.

Results: ANOVAs yielded significant trial x age interactions for three percent looking to match measures, Testtotal: F (1, 81) = 16.41, p < .001, Test1×half: F (1, 81) = 9.12, p = .003, Test2×half: F (1, 81) = 15.92, p < .001. For both children with and without ASD, the younger groups looked longer at the match (i.e., objects) during the test than the control trials, whereas the older group looked more at the nonmatch (i.e., actions) during the test than the control trials. Specifically, the TD/younger group looked longer at the objects during the total, t(17) = 2.54, p = .01, and the 2×half, t(17) = 2.29, p = .02, of the test than the control trials, and the ASD/younger group showed such pattern during the 2×half of the test than the control trials, t(23) = 1.86, p = .04. Contrastively, the TD/older group looked longer at the actions during the total, t (20) = 2.12, p = .02, and the 1×half of the test, t (20) = 2.23, p = .02, than the control trials, while the ASD/older group exhibited such pattern during the 2×half of the test than the control trials, t(21) = 2.34, p = .02.

Conclusions: Similar as TD toddlers, Mandarin-exposed preschoolers with ASD alter from noun bias to verb bias in word learning as they grow. Regardless of the diagnoses, children’s word learning processes may be initially guided by universal principles of human language and later shaped by specific features of the target language.
Background: Despite having normal hearing, a considerable number of children with autism reported classroom noises as explicitly agonizing sensory experiences (Cooperative Research Centre for Living with Autism, 2018) and exhibited varying degrees of speech-in-noise perception (SPIN) issues. Growing evidence suggests that hearing assistive technology (HAT) is a viable solution to the SPIN issue in children with autism spectrum disorder (ASD). However, very little is known about its efficacy in tonal language speakers.

Objectives: This study compared sentence-level SPIN performance between Chinese children with ASD and neurotypical (NT) controls and evaluated HAT use in improving the ASD group’s SPIN performance and ease of SPIN difficulty.

Methods: Children with ASD (n=26) and NT children (n=19) aged 6-12 performed two adaptive tests in steady-state noise and three fixed-level tests in quiet and steady-state noise with and without using HAT. Speech recognition thresholds (SRT) and accuracy rates were assessed using adaptive and fixed-level tests, respectively. Parents or teachers of the ASD group completed a questionnaire regarding children’s listening difficulty under six circumstances before and after a ten-day trial period of HAT use.

Results: No significant difference in SRT was found between the two groups. However, the ASD group showed a significantly lower accuracy rate than the NT group in noise, and the ASD group’s accuracy rate decreased significantly with background noise, but the NT group did not. There was a general improvement in listening difficulty ratings across all conditions after the device trial.

Conclusions: The findings indicated inadequate SPIN in the ASD group and provided an opportunity to adopt a relatively more sensitive measure to gauge SPIN performance among children. In response, the ASD group’s markedly increased accuracy rate in noise during HAT-on sessions confirmed the feasibility of HAT for improving Mandarin speakers’ SPIN performance in controlled laboratory settings, and the ASD group’s reduced post-use ratings of listening difficulty provided evidence for the benefits of HAT use in daily scenarios.

Background: Language delay (LD) is suggested to be one of the earliest manifestations in children with autism although not all autistic individuals are diagnosed with LD. Previous studies have shown that autism and LD both have a strong genetic predisposition; however, few studies have tested the degree to which the same genetic influences underlie autism and LD. Objectives: We aimed to use the classical twin design to assess the degree to which the genetic influences on autism also associates with LD. Methods: Data were collected from participants in the Child and Adolescent Twin Study in Sweden (CATSS). CATSS is an ongoing population-based study of twins born in Sweden since 1992. The families are contacted when the twins are 9 or 12 years of age to complete a structured association of participants in the Child and Adolescent Twin Study in Sweden (CATSS). Current age information of autism diagnosis was collected from NPR. We used the classical twin design to first estimate the degree to which autism and LD associates with LD. Methods: Data were collected from participants in the Child and Adolescent Twin Study in Sweden (CATSS). CATSS is an ongoing population-based study of twins born in Sweden since 1992. The families are contacted when the twins are 9 or 12 years of age to complete a structured association of participants in the Child and Adolescent Twin Study in Sweden (CATSS). Current age information of autism diagnosis was collected from NPR. We used the classical twin design to first estimate the degree to which autism and LD associates with LD.

Methods: Children with ASD (n=26) and NT children (n=19) aged 6-12 performed two adaptive tests in steady-state noise and three fixed-level tests in quiet and steady-state noise with and without using HAT. Speech recognition thresholds (SRT) and accuracy rates were assessed using adaptive and fixed-level tests, respectively. Parents or teachers of the ASD group completed a questionnaire regarding children’s listening difficulty under six circumstances before and after a ten-day trial period of HAT use.

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430.033 (Poster) Heritability and Genetic Correlation of Language Delay and Autism in Swedish Twins


Methods: Children with ASD (n=26) and NT children (n=19) aged 6-12 performed two adaptive tests in steady-state noise and three fixed-level tests in quiet and steady-state noise with and without using HAT. Speech recognition thresholds (SRT) and accuracy rates were assessed using adaptive and fixed-level tests, respectively. Parents or teachers of the ASD group completed a questionnaire regarding children’s listening difficulty under six circumstances before and after a ten-day trial period of HAT use.

Results: No significant difference in SRT was found between the two groups. However, the ASD group showed a significantly lower accuracy rate than the NT group in noise, and the ASD group’s accuracy rate decreased significantly with background noise, but the NT group did not. There was a general improvement in listening difficulty ratings across all conditions after the device trial.

Conclusions: The findings indicated inadequate SPIN in the ASD group and provided an opportunity to adopt a relatively more sensitive measure to gauge SPIN performance among children. In response, the ASD group’s markedly increased accuracy rate in noise during HAT-on sessions confirmed the feasibility of HAT for improving Mandarin speakers’ SPIN performance in controlled laboratory settings, and the ASD group’s reduced post-use ratings of listening difficulty provided evidence for the benefits of HAT use in daily scenarios.
Background: While socioeconomic disadvantage has been associated with poor health outcomes and access to care there is little research on how this may affect outcomes of social communication in autistic populations. Socioeconomic status has been noted to predict receptive language (Brignell et al., 2018) and correlate with symptomatology (Chandler et al., 2015) in autistic children, as well as contribute to the worsening of attention problems (Santiago et al., 2011). Research also suggests that ADHD symptoms can exacerbate social impairment in autistic children (Factor et al., 2017). Despite this, there are gaps in the research regarding characteristics of individuals with socioeconomic disadvantage that may influence these effects. The Area Deprivation Index uses census data to operationalize socioeconomic disadvantage based on geolocation (Hu et al., 2018) and can be utilized to better understand how socioeconomic disadvantage may influence autistic populations. This study addresses gaps in the literature to contextualize influences of socioeconomic disadvantage on communication.

Objectives: The present study aimed to examine factors that influence communication in autistic children (9-15 years). This study examined: a) the relationship between socioeconomic disadvantage and communication skills in autistic children; b) whether attention problems mediate the relationship between area deprivation and communication in autistic children; and c) whether race, support needs, and who the child lives with influence the strength of the relationship between these factors.

Methods: The sample comprised 375 children with an autism diagnosis collected through the Simons Powering Autism Research for Knowledge (SPARK) Research Initiative. Multiple regression and mediation analyses were used to examine the relationships between socioeconomic disadvantage (Area Deprivation Index), communication level (Vineland-3 Communication Domain Standard Score), and parent-reported attention problems (via CBCL), with additional predictors of age, sex, race, and number of parents in the household.

Results: The sample represents a diverse population and wide range socioeconomic need (See Table 1 for descriptive statistics). Attention problems were evaluated as a mediator of the effect socioeconomic disadvantage has on communication level in autistic children using hierarchical regression and mediation analyses. Attention problems did not significantly mediate the association between socioeconomic disadvantage and communication level (95% CI: -1.394 to .088). However, higher levels of socioeconomic disadvantage were significantly associated with lower communication levels, B=-2.38, SE=1.01, t(374)=-2.34, p<.05 and accounted for 1.4% of the variance in communication level, R2= 0.014. Additionally, higher levels of attention problems were significantly associated with lower communication levels, B=-.64, SE=.08, t(374)=-7.57, p<.001 and accounted for an additional 13.2% of the variance in communication level beyond that explained by socioeconomic disadvantage, sr2 = .132. The other paths tested were insignificant. Additional planned analyses further examine potential mediators, moderators, and covariates that influence communication levels.

Conclusions: Results indicated a small but significant association between socioeconomic disadvantage and communication level across a broad range of socioeconomic need, but not when controlling for attention problems. Additionally, attention problems were associated with communication level. This study will improve understanding of the relationships between socioeconomic disadvantage and outcomes that extend beyond what has been previously researched.

Background: Autism spectrum disorders (ASD) research has increased over the past 30 years, advancing knowledge of ASD in preschool-aged and higher-functioning individuals. However, few studies have been conducted on non-verbal (NV) and/or minimally verbal (MV) children with ASD. The few studies that have addressed this topic have reported varying levels of prevalence. Older studies suggested that 50% of ASD children were non-verbal (NV) or minimally verbal (MV), while more recent reports offer impairment estimates in the 25% - 35% range. Most of the published studies have reported findings were based on convenience or clinical samples, a significant limitation.

Objectives: Objectives of this cross-sectional study were twofold. The first objective was to determine the proportion of children with ASD that are NV and/or MV. The second objective was to describe the distribution of verbal capacity in ASD children according to demographic factors, including age, sex, race/ethnicity, and socioeconomic status (SES).

Methods: Data were collected from an active ASD surveillance system representing children born in 2008 and residing in New Jersey in 2016. Retrospective information on demographic factors and diagnosis, functional status and language capacity was collected for each child from medical and special education records. Language capacity at and after age 48-months was defined by a tripartite classification: verbal - the child can answer and speak in sentences; minimally verbal - the child can speak in 1 or 2-word phrases; and, non-verbal - the
child produces sounds but not intelligible words. Pearson Chi-square test was used to compare differences between verbal and NV/MV cases. Data were stratified by sex, race, and median household income - a proxy of socioeconomic status (SES).

Results: 1055 8-year-old children were identified with ASD through active surveillance (32 per 1,000). Fifty-six children had insufficient information to determine language capacity and were excluded from consideration, leading to analysis of data from 999 children. We identified 188 ASD children as NV/MV by age 8-years, representing 18.8% of the total ASD population and yielding an NV/MV prevalence estimate of 5.7 per 1,000. A majority of the ASD population had verbal language capacity, consistent with an estimated prevalence of 24.6 per 1,000. Among the 380 children who satisfied the case definition for NV/MV at age 4-years, 206 (54.2%) showed verbal capacity by 8-years (p<0.0001).

While there were no sex differences, we identified variations by race/ethnicity and SES. 8.4% of Non-Hispanic White children were NV/MV, compared to 31.0% of Non-Hispanic Black and 24.6% of Hispanic children. Similarly, ASD children in High-SES areas had higher odds of having verbal capacity compared to children from Low-SES areas (AOR: 3.0; 95% CI: 1.8-5.3).

Conclusions: In the large diverse population, we found that nearly 1-in-5 ASD children showed minimal verbal language capacity at 8 years, a lower proportion than indicated by previous estimates. Approximately half of NV/MV children at age-4 showed verbal language at 8-years, a significant change. The findings reveal disparities in verbal language capacity across demographic groups, thereby highlighting the need for more effective screening and intervention programs, especially ones targeting under-served populations.

430.037 (Poster) Joint Engagement and Communication Skills in Pre-Schoolers with Autism Spectrum Disorder: An Exploratory Study Using Naturalistic Play Context
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Background:
Joint engagement is a behavioural state where the child and their social partner are actively engaged with the same object or event. Supported joint engagement requires child and caregiver involved with the same object or event, without actively acknowledging the caregiver’s participation. While, in coordinated joint engagement, both child and caregiver are not only actively involved with the same object or event, but needs child to actively and repeatedly acknowledging the caregiver’s participation. Joint engagement is a precursor to communication development, which needs detailed assessment, particularly in children with Autism Spectrum Disorder (ASD).

Objectives:
The objective of the study was to explore the joint engagement and communication skills of pre-schoolers with ASD using naturalistic play context.

Methods:
The present study was conducted in the speech pathology outpatient units of two private hospitals in a South Indian town. The sample included ten parent-child dyads, of children with ASD in the age group of 3 to 5 years (mean age: 3.7 years). All children received a diagnosis of mild to severe ASD by qualified psychiatrists based on DSM 5 criteria, and were attending communication intervention. Written informed consent was obtained from the respective parents before the assessment. The Communication Play Protocol (CPP) was then administered (with authors’ permission) to measure child’s joint engagement and communication skills during a video-recorded play session with their respective parents.

CPP is a semi-structured observation context that is designed to display how a young child communicates with an adult in a naturalistic environment. In this study, we assessed three communicative functions, namely, requesting, social interaction, and commenting, using two five-minute scenes, for each communicative function. Each parent-child dyad session was videotaped, and each session comprised of 6 scenes and lasted for around 15 minutes. The video recordings were then independently coded by the researcher and another clinician (who was blinded to the study). Both coders received training on identifying the specific variables of child’s joint engagement and communication skills as per CPP manual. The inter-rater reliability between the two examiners was computed using Cohen’s Kappa test.

Results:
The results of this study indicate early joint engagement and communication skill deficits in children with ASD during an uninterrupted play session with a parent. Table 1 shows the responses for joint engagement and communication skills across ten pre-schoolers with ASD. The CPP allows observing the parent and the child in various communicative contexts and time. Children in this study spent most of their time in object engagement and rarely participated in supported or coordinated joint engagement. Most of the participants in the current
study preferred playing with toys and rarely responded or initiated communication with their parents. Inter-rater reliability between the raters revealed a substantial agreement, Cohen’s Kappa, $k=0.6$ ($p<0.001$).

Conclusions:

The findings from this study revealed that a naturalistic play method can be used to assess joint engagement and communication skills in preschoolers with ASD. Additionally, this play method can be used in children with varying severity levels of ASD.

430.038  (Poster)  Language Impairment in Autism Studies Underreport Participant Sociodemographics: A Systematic Review

Background: Racially and ethnically minoritized autistic individuals face disparities in diagnosis and service delivery, as well as in research representation. Clinicians and researchers commonly use age-referenced assessments, as well as the research literature, to qualify school-aged individuals for services and to characterize their language profiles. However, the representation of minoritized autistic individuals in research using such assessments is not well understood, with important implications for the generalizability of findings. To address this gap, this systematic review examines reporting practices for participant sociodemographics in studies using age-referenced assessments to evaluate language impairment in autistic school-age individuals.

Objectives: This review asked two primary research questions: 1) What are the reporting practices for participant sociodemographics in terms of race and ethnicity, gender and sex, and SES in studies on LI in autistic school-age individuals? 2) What are the sociodemographics in the literature to date?

Methods: The authors preregistered this systematic review with PROSPERO (CRD42021260394) and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol. Database searches took place on August 11, 2021, with an updated search on September 20, 2022, and included Linguistics and Language Behavior Abstracts, PsycINFO, PubMed, and the Directory of Open Access Journals from 1980 to 2022. Search terms included three essential concepts: autism, language, and age. Two coders independently screened and evaluated articles, discussing any disagreements until they reached consensus.

Results: A total of 60 studies qualified for this review addressing linguistic dimensions relevant to language impairment. Of these studies, just 17 (28%) reported any information on participant race and ethnicity. When reported, white participants comprised the majority of participants. Just 17% of studies reported any information on socioeconomic status; more studies reported at least some information on gender or sex (52%). No reporting was intersectional (e.g., reporting race by ethnicity by gender), even in studies with sufficiently large sample sizes.

Conclusions: A systematic review of studies of LI in autism, focusing on ages 3-21, indicates insufficient reporting of participant race and ethnicity and a systematic exclusion of minoritized individuals, who despite being a global majority, continue to be persistently underrepresented in research on language in autism. Replicable reporting presents a simple and necessary step; however, in addition, systemic action is necessary to mitigate inequity in this area of research.

430.039  (Poster)  Language Skill Difference Further Distinguish Social Sub-Types in Children with Autism
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Background:

Language skills are a key aspect of heterogeneity in Autism Spectrum Disorder (ASD). Given that language delay has been associated with a greater incidence of autism (Eigsti et al., 2011; Howlin, 2003), a more in depth and systematic focus on language development (i.e. atypicality inverbal performance) could help with diagnosis and early intervention for children with autism.

However, no studies to date have assessed language skills in the three autism social subtypes compared with typically developing (TD) individuals. Such a cross-subtype study will help provide a better understanding of the status of language development in autistic children with different social phenotypes and identify which ones might benefit particularly from language training interventions.

Objectives:
This study investigated heterogeneity in language skills of children with autism and their relationship with different autistic social subtypes (aloof, passive, active but odd-ABO).

Methods:

A sample of 120 children aged from 3 to 6 years participated in the study, 90 diagnosed with ASD (10 girls (11%), mean age = 4.62 years, SD = 0.58) and 30 age-matched TD children (6 girls (20%), mean age = 4.68 years, SD = 0.45.

Measures included Autism Diagnostic Observation Schedule (ADOS) the Autism Behavior Checklist (ABC), 1988), Childhood Autism Rating Scale (CARS), and Gesell Developmental Schedules (GDS), which all contain a language subscales, and the Beijing Autism Subtyping Questionnaire (BASQ). Language proficiency and skills (performance) were evaluated using a validated Chinese vocabulary test for young children for concrete and abstract words. The TD group were only administered GDS and the vocabulary test.

Results:

We found negative correlations between autism symptom severity (via ABC, CARS, ADOS) but positive correlations between GDS and expressive language skill. The BASQ identified social subtypes exhibited different levels of impaired expressive skills (aloof > passive > active but odd). Using a categorical approach, for concrete items the aloof and passive subtypes exhibited worse performance compared to the TD group but not the active but odd subtype. For abstract items all three subtypes were impaired relative to the TD group. Furthermore, with a dimensional approach, there was a strong negative association between dimension scores and language expressive performance across subjects on the aloof dimension. Linear regression models indicated that the aloof dimension contributed most compared to the other two dimensions in terms of language performance. A ROC analysis showed that language skill performance for both concrete and abstract words could effectively discriminate between the different ASD subtypes.

Conclusions:

Overall, results demonstrate that the different social subtypes in autism are associated with different levels of language skill and can also be accurately identified using this metric. Importantly, our findings also suggest that use of patterns of individual scores on the dimensions of the three subtypes may be informative for predicting language problems with scores on the aloof dimension being positively associated with them. In addition, considering that different social subtypes exhibited different levels of expressive language skills future language interventions should be considered, particularly for individuals scoring high on the aloof dimension.

Background: Although language deficit is not a defining criterion in Autism Spectrum Disorder (ASD) (DSM–V, APA 2013), lexico-semantic knowledge, among other language skills, is an area of difficulty for some children with ASD (Kwok et al., 2015). The linguistic situation of Arabic is characterized by diglossia, which involves the use of two language varieties within the same speech community for a complementary set of functions (Ferguson, 1959; Al Birini, 2016): Spoken Arabic (SpA) for everyday speech and Standard Arabic (StA) for formal speech and writing. The lexicon composition of Palestinian-Arabic-speaking preschoolers disperses over three categories (Saiegh-Haddad & Spolsky, 2014): (1) identical words in StA and SpA (21.2%), (2) cognate words which show partial overlaps in phonological forms (40.6%) (3) unique-SpA words which are not used in StA (38.2%). School aged children make use of (4) unique StA words (Asli-Badarneh, et al., 2022). Surprisingly, a recent multiple-case study showed that Tunisian-Arabic-speaking children with ASD favored StA in their everyday conversations (Kissine et al., 2019).

Objectives: The present study investigated, for the first time, lexico-semantic skills of Palestinian-Arabic-speaking children with and without ASD in the context of diglossia. Research on language skills in Arabic-speaking children with ASD is scarce although Arabic is the fifth most spoken language globally (Simons & Fennig, 2018).

Methods: 77 Palestinian-Arabic-speaking children aged 4-11 were recruited in 3 groups matched for age, all scoring within non-verbal IQ: Children with TLD (n=39), children with ASD with intact (ASD+NL: n=19) and with impaired structural language (ASD+LI: n=19). Two tasks were administered: (i) an Arabic noun and verb production tasks (Armon-Lotem et al., 2020) containing 30 nouns and 30 verbs; (ii) a narrative production task (Gagarina et al., 2015). The coding schemata took into consideration lexico-phonological distance between StA and SpA (Identical, Cognate, Unique-SpA, Unique-StA).

Results: Using mixed-effects modelling, for noun production, effects of Group (TLD>ASD+LI, TLD=ASD+NL, ASD+NL=ASD+LI), Distance (Unique-SpA>Cog>Identical) emerged, yet no Group*Distance interaction. For verb production, there were effects of Group,
Narration (storytelling) is an essential social-communication skill that is often impacted in ASD, where differences in social attention may influence aspects of narrative ability, such as connecting narrated events within overarching psychologically- and socially-salient themes. Narrative differences have been reported cross-culturally in ASD, and subtle narrative differences have also been observed among parents, suggesting that narration is a key skill impacted in ASD across language and cultural environments, and even among clinically unaffected relatives who are at increased genetic liability. This study builds on prior work through comprehensive among parents, suggesting that narration is a key skill impacted in ASD across language and cultural environments, and even among clinically unaffected relatives who are at increased genetic liability. This study builds on prior work through comprehensive

Conclusions: The current study investigated lexico-semantic production patterns of children with ASD in Arabic diglossia compared to their peers with TLD. At a group level, children with ASD, similarly to their peers with TLD, rely more on lexical items from their spoken variety (SpA). Nevertheless, a small number of children with ASD+NL use words from StA, the formal variety, even in an oral storytelling task. Note that children are used to stories being read in StA, which might also be a factor. We will discuss this inter-individual variability in terms background factors (e.g., Age, ASD severity).

430.041 (Poster) Linguistic Correlates of Atypical Brain Lateralization for Speech Processing in Children with Autism Spectrum Disorder: An fNIRS Study

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Background: Atypical speech and language development are prevalent in individuals with autism spectrum disorder (ASD). One candidate mechanism to explain the atypical language profiles of ASD is reduced neural specialization for the processing of linguistic structures. It is well-documented that autistic individuals tend to display reduced or absent leftward hemispheric lateralization in response to speech and vocal sounds. However, it is still unclear that what specific linguistic and phonological component is driving the altered brain lateralization.

Objectives: 1) to explore the feasibility of using functional near-infrared spectroscopy (fNIRS) to measure the brain function of speech-impaired children with autism; 2) to verify whether atypical hemispheric lateralization for language applies to individuals with ASD who speak Mandarin Chinese as their native language; 3) to explore the linguistic and phonological components of the vocal stimuli that may drive the atypical lateralization in autism.

Methods: The participant sample included 20 children with autism (age M =5.8 years, SD = 2.2 years) and 20 age-matched neurotypical (NT) children (age M =6.5 years, SD =1.7 years). The participants wore a 3×11 fNIRS cap covering the bilateral temporal and frontal lobes and were instructed to watch a self-chosen muted cartoon while ignore any sounds. The auditory stimuli were presented in a block-design via headphones. Four stimulus conditions were constructed with parametrically decreasing linguistic content: naturally spoken paragraph in native language (linguistic integrity preserved), native speech with scrambled word order (phonological integrity preserved), nonnative speech (speechness preserved) and music (nonspeech). Neural responses were mainly represented by estimates of changes in oxyhemoglobin (HbO) concentration.

Results: Both the autism group and the NT group displayed significant response to native speech and nonnative speech in the left temporal lobe. The autism group showed significant bilateral responses to scrambled native speech, but we did not observe such changes in the NT group. In the NT group but not the autism group, leftward lateralization of the temporal activities systematically decreased with decreasing linguistic content. Lateralization was absent for the scrambled native speech condition driven by enhanced response in the right hemisphere in the autism group only.

Conclusions: Our results replicated previous findings of atypical hemispheric specialization for speech processing in autism in the context of Mandarin Chinese. By using auditory stimuli with parametrically varying linguistic content, we demonstrated that linguistic status drives the hemispheric lateralization in the NT children but not in the ASD children. Instead, hemispheric lateralization for speech was absent at the phonological level, which was associated with abnormally heightened right-hemisphere activities. The findings provide further evidence for understanding insufficient language-specific neural specialization in autism.

430.042 (Poster) Narrative As a Critical Pragmatic Language Skill: A Cross-Contextual and Cross-Linguistic Study of Narrative Ability in ASD and First-Degree Relatives

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Background: Narration (storytelling) is an essential social-communication skill that is often impacted in ASD, where differences in social attention may influence aspects of narrative ability, such as connecting narrated events within overarching psychologically- and socially-salient themes. Narrative differences have been reported cross-culturally in ASD, and subtle narrative differences have also been observed among parents, suggesting that narration is a key skill impacted in ASD across language and cultural environments, and even among clinically unaffected relatives who are at increased genetic liability. This study builds on prior work through comprehensive
characterization of narrative ability across multiple contexts and two typologically-distinct languages, and examination of associated visual attention patterns in ASD and first-degree relatives, with the goal of informing potential genetic and cultural/linguistic influences on narrative in ASD.

**Objectives:** To comprehensively characterize narrative ability across multiple contexts (high, low structure) and languages (English, Cantonese), and assess its relationship with visual attention in ASD and first-degree relatives (parents, siblings).

**Methods:** Participants included 369 English-speaking individuals from the United States (US), comprised of 56 autistic individuals (US-ASD), 42 siblings of autistic individuals (US-ASD-Sib), 161 parents of autistic individuals (US-ASD-Par), 49 typically-developing controls (US-TD), and 61 parent controls (US-TD-Par). For cross-cultural comparisons with the ASD and control groups, 71 Cantonese-speaking individuals from Hong Kong (HK) were included, with 22 HK-ASD and 49 HK-TD participants. Participants narrated a wordless storybook presented on an eye tracker (First Telling; high structure) and retold their narrative after a delay without visual cues (Retell; low structure). Key aspects of narrative quality were coded (e.g., thoughts/emotions, causal attributions). Percent of fixations towards the storybook’s social elements were analyzed in relationship to narratives within groups.

**Results:** Neither the US-ASD nor US-ASD-Sib groups showed expected context differences (i.e., benefit from viewing the illustration in First Telling), with comparable narratives across contexts. Other groups showed stronger narrative performance in the First Telling. Within contexts, group differences emerged only in US groups—ASD, sibling, and parent groups produced narratives with fewer descriptions and causal attributions of characters’ thoughts/emotions relative to controls groups. Culture effects emerged between US and HK groups for descriptions of thoughts/emotions (fewer descriptions in HK), but there were no diagnostic effects. More visual attention to social stimuli was associated with higher-quality First Telling narration in the US-ASD-Par and both HK groups.

**Conclusions:** Context differences suggest that autistic individuals and their siblings from the US did not benefit from visual support/organization the same way as control and HK groups. Results support previous findings of narrative difficulty in usage of cognitive/emotional terms. Similar patterns in relatives provide evidence of a potential genetic link, but evidence of cultural effects was also strong. Variable gaze-narrative associations across groups may implicate differential strategies for integrating visual attention and language simultaneously (First Telling) and asynchronously (Retell). Additional analyses will further detail visual attention patterns associated with ASD and cultural groups. In sum, findings implicate key features of narrative ability impacted in ASD, first-degree relatives and across cultures, and others that are malleable to environmental (cultural) and linguistic influences.

**430.043 (Poster) Narrative Production Abilities of Hebrew Speaking Children with ASD**

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**Background:**

Narrative production is a social-communicative ability that children improve as they get older. In order to produce a coherent narrative, the child must master and integrate linguistic skills at both the micro-level (semantics, syntax, phonology and pragmatics) and the macro-level (narrative structure, coherence, reference to characters). Children with ASD were previously found to struggle with different aspects of narrative production, a fact that has a profound effect on their social functioning. Previous studies that tested the narrative production skills of children with ASD found that compared to typically developing children, children with ASD had low syntactic scores (Capps & Losh, 2003) and low production scores of emotional terms (Rumph et al., 2012). Most previous studies focused on English speaking children with ASD and tested a specific type of narrative.

**Objectives:**

The aim of the current study was to test the narrative production of Hebrew-speaking children with ASD on five different narratives and compare their productions on a micro and micro level to age-matched TD children.

**Methods:**

Participants included 64 children (32 ASD: mage = 6:5; SD = 94.5; 32 TD: mage 6:52; SD 96.93). Children with ASD all had normal-range-IQ scores. Background variables included a linguistic score, ToM abilities and Nonverbal IQ. Narrative production was tested by elicitation of five different narratives (a personal narrative, a narrative from everyday life—elicitation and retelling; and an imaginary narrative—elicitation retelling). Data analysis was conducted at the micro level and macro level. Between groups comparisons were made on all variables tested and between the different narratives. In-group analysis was made in order to compare the productions between narratives.

**Results:**
Micro-level results found that the ASD group produced more verbs and pronouns on the imaginary retelling narrative and the everyday telling narrative than the TD group. The TD group was found to produce more clauses in all narrative types (except for the personal narrative) and produced more prepositions in both imaginary narratives (told and retold). Furthermore, the TD group was found to produce more mental verbs and conjunctions. No group differences were found on any of the Micro level variables regarding the personal narrative.

Macro-level results showed that the ASD group had higher scores on the goal and reaction variables in both the imaginary narratives while the TD group had higher scores of the attempt and outcome variables in both imaginary narratives and in the everyday telling narrative. Macro level scores indicate that for many children with ASD the comprehension of the narrative was better than its production.

Conclusions:

Results in the ASD group were heterogeneous; some had difficulty constructing the narrative according to the sequence of events while others showed a limited vocabulary alongside syntactic deficits.

This study highlights the fact that the type of narrative has an effect on the production abilities of children with ASD, something that future studies should keep in mind when planning research protocols. The individual differences found in this study show how important it is to systematically evaluate each child before starting an intervention program.

430.044 (Poster) Narrowing the Gap: Acoustic Differences in Autistic Children’s Speech May Shrink with Time and Familiarity


Background: Voice conveys rich information about speakers, including physical health and neurodevelopment. Previous studies have shown that autistic children’s voices differ from neurotypical peers in a variety of ways: for example, autistic children have been found to produce speech with greater jitter and shimmer, lower harmonic-to-noise ratio (HNR), and wider pitch ranges compared to neurotypical children (Fusaroli et al. 2017). However, these findings are often measured in lab-based settings and are rarely assessed over time, leaving questions about feature stability and reliability unanswered.

Objectives: Examine whether acoustic features known to differentiate autistic children from neurotypical peers are stable during a longitudinal home-based telephonic voice collection protocol, and query whether participants’ daily condition affects acoustic characteristics.

Methods: Autistic (n=18, 13 boys, mean age=9.3±2.5 years, mean IQ=115.5±14.6) and neurotypical (n=17, 6 boys, mean age=9.9±2.8 years, mean IQ=118.7±13.8) children participated in a longitudinal telephonic study (results from the final sample of 48 will be reported in May 2023). Participants performed several sessions for seven weeks (one session per week), including a picture description task. We analyzed picture descriptions from the first three sessions. Using openSMILE, we extracted jitter, shimmer, HNR, pitch, and mean, standard deviation, skewness, kurtosis of spectral moments, and calculated durational measures using an in-house speech activity detector. At each session, caregivers reported on children’s sleep, eating, mood, stress, and attention. We built linear mixed-effects regression models to examine longitudinal changes in acoustic variables, covarying for sex and including individuals as a random effect.

Results: Autistic children’s median jitter (β=-0.0001, p<0.001) and shimmer (β=-0.007, p<0.001) values decreased over time, whereas their median HNR (β=0.52, p=0.006) and total pause duration (β=4.89, p=0.042) increased, resulting in smaller group differences in later sessions (jitter: β=-0.001, p=0.005, shimmer: β=-0.01, p=0.001, HNR: β=-0.56, p=0.036, total pause: β=-10.38, p=0.003, Fig.1A-D). Autistic children’s median spectral skewness values (β=-0.78, p=0.017) and pause rate per minute (β=4.26, p=0.047) were higher than those of neurotypical children at the first session, and the group differences did not change over time (skewness: p=0.092, pause rate: p=0.19), suggesting that these might be stable voice markers that differentiate diagnostic groups. Children with less stress produced lower median jitter values (β=-0.001, p=0.014) and those with good attention produced shorter total and mean pause durations (total: β=-8.5, p=0.02, mean: β=-0.27, p=0.014) and higher pause rates (β=1.9, p=0.029) compared to those with more stress or average attention levels, regardless of group or sex (Fig.2A-D).

Conclusions: Results revealed key acoustic features that differentiate autistic children from neurotypical children cross-sectionally, but some were found to change over time and/or be affected by children’s daily stress or attention levels. These results can be used to inform the selection of voice-based biomarkers to monitor intervention response or identify diagnostic group differences, with the goal of finding markers that are stable over time and across changing internal and external conditions.
Background: The discourse marker “um” can be used to serve various discourse functions, including turn-taking (Fischer, 2000). Research finds autistic individuals use “um” less often than non-autistic (NonAu) individuals in discourse contexts where they answer questions during diagnostic testing (Gorman et al., 2016), describe how to play a sport (McGregor & Hadden, 2020), and describe pictures (Irvine et al., 2016). These authors argue that paucity of “um” use is due to autistic individuals’ general pragmatic challenges (e.g., inappropriate turn-taking). However, a recent study reported no difference in “um” usage between NonAu and autistic children during conversation (Boo et al., 2022). This suggests that differences in “um” use may not persist across all contexts.

Objectives: To compare “um” use by NonAu and autistic speakers in other discourse contexts, such as a dialogic exchange versus monologic storytelling.

Methods: Data came from two separate discourse tasks: 12 Autistic and 16 NonAu teenagers were selected from a longitudinal study of early language (Naigles & Fein, 2017). Dialogic language samples were derived via conversation with a researcher, who first shared a personal narrative and then prompted the teenager to talk about a similar experience (e.g., “The other day I lost my keys...Have you ever lost anything?”). While the teenager narrated their own experiences, the adult provided backchanneling responses and comments (e.g., “uh-huh”, “tell me more”). In a monologic discourse task, 20 Autistic and 20 NonAu teenagers were asked to develop and narrate a fictional story to a panel of judges (on a video call) who did not backchannel or comment (i.e., Trier Social Stress Test; Kirschbaum et al., 1993). The four groups did not significantly differ in chronological age, but they did differ in CELF-5 scores, with the Autistic group who completed the dialogic task having the lowest CELF-5 scores among the four groups (Table 1). In both language samples, all instances of “um” tokens were tallied.

Results: “Um” tokens did not differ between Autistic and NonAu teenagers in the dialogic task. In the monologic task, NonAu children produced more “um” tokens than autistic children, \( t(38) = -2.097, p = .043 \). Significant cross-task differences also emerged (\( F(3, 64) = 6.974, p < .001, \eta^2 = .246 \)): the NonAu autistic group from the dialogic task produced significantly more “um” tokens than both the NonAu and autistic groups from the monologic task (Figure 1). This finding remained significant even after statistically controlling for chronological age and CELF-5 scores.

Conclusions: Findings suggest that “um” use differs depending on the nature of the discourse context (i.e., monologic vs. dialogic), not depending on the group. In dialogic exchanges, autistic teenagers use “um” similarly to NonAu peers, suggesting they recognize this marker’s usefulness as a turn-taking device. In monologic contexts, this function of “um” is unnecessary and, thus, used less. Therefore, researchers should carefully consider the nature of the discourse context when they are interpreting between-group differences of “um”; our findings suggest that autistic children’s relatively infrequent use of “um” cannot be due to diagnosis-related differences in turn management.
Results: Changes to the Q-SoCIAL based on participant feedback fell into three main areas: (1) changes in instructions and response options, (2) addition of new questions, and (3) rewording or addition of examples to clarify existing questions. Participants stated that they typically did not read all the instructions in the measure and identified several parts of the instructions as redundant or unnecessary, leading us to consolidate the instructions and emphasize areas of importance. A total of 46 new/restructured questions were added based on participant feedback. For example, there was repeated mention of children feeling exhausted after social interaction, prompting the addition of the item, “My child seems emotionally exhausted after long periods of social interaction.” This item reflects many concerns about autism ‘camouflaging’ and social burnout stated by the autistic community (Lai et al., 2021). The wording of 80 items underwent minor changes based upon participant feedback. Participants provided a great deal of positive feedback on items, endorsing the context dependent-individualized nature of the questionnaire. The Q-SoCIAL consisted of 173 measure items after cognitive interview refinement.

Conclusions: Parents and teachers of autistic children provided important feedback in order to refine the Q-SoCIAL. This feedback resulted in changes to item wording, addition of examples, clarification to instructions, and input on items that should be included. The validation of existing items was reinforced, with strong parent and teacher enthusiasm about the strengths-based, inclusionary approach to understanding their child or student’s social communication. This study has demonstrated that stakeholder perspectives are crucial in measurement development and in capturing individual differences in social communication.

430.047 (Poster) Phonetic Alignment in Semi Naturalistic Conversations

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Background:

Phonetic convergence is a natural phenomenon whereby interlocutors unconsciously alter their verbal and non-verbal behaviors to align with those of their conversation partner (Pardo, 2006). Convergence comes along with associated benefits such as conversational fluidity, better cooperation and greater empathy, rapport, and closeness. Accordingly, it also has an impact on the first impression individuals make on other, and influences the quality of the subsequent interactions and the relationships (Soliz & Giles, 2014). Pitch, measured as voice signal fundamental frequency (F0), is the prosodic indexes that has been the most extensively studied in the context of phonetic convergence. A few previous studies suggest autistic individuals tend to converge less than non-autistic individuals (e.g. Lehnert-Lehouilliert et al., 2020). However, these studies involved controlled experimental paradigms, in which participants are asked to read the same list of words before and after a cooperative task. In such context, it appears easier to converge than in a naturalistic conversation.

Objectives:

Studying phonetic convergence in more naturalistic contexts seems crucial to understand the impact it can have on everyday interactions of autistic individuals. This study aims to study phonetic convergence in semi naturalistic conversations by investigation variation in F0.

Methods:

In this study, 30 participants (15 autistic and 15 non-autistic) from 9 to 16 years old (M = 11.2) engaged in a three minute get-to-know talk with the investigator. They were then asked to tell a story based on a wordless picture book. The experimenter always began the task by describing the first page of the book. We analysed mean F0 per sentence, and speech rate form this first segment by the experimenter, as well as at three time points from the child’s speech: when the child starts the story telling, in the middle of it and at the end. We expected greater phonetic convergence (less mean absolute difference) at time point 1 and a progressive shift (greater mean absolute difference) from time 2. We expected non autistic participants to have a greater difference in mean absolute F0 between time point 1 and time point 3, indicating greater phonetic convergence.

Results:

Contrary to our expectation, linear regressions did not show difference in F0 mean absolute and speech rate difference across time. These results seem to indicate that participants, regardless of the group diagnosis, do not converge in a more naturalistic setting.

Conclusions:

This yields interesting questions concerning the methodological choices, as phonetic convergence has found to be weaker in challenging task (Abel, 2015). Narrative tasks could be too difficult for participants to engage in convergence. Furthermore, as raised by Hogstrom et al. (2022), the age difference between experimenter and children could be an explanation to our results, as anatomic development has an obvious impact on F0 and may limit the degree of convergence. Finally, a strong limitation to this study is the small sample size; our method should then be replicated with a larger sample size.

430.048 (Poster) Predictive Validity of Parent-Reported Language Skills in Children with and without ASD
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Background:

Parent reports are widely used to assess early language skills. Evidence shows that these are useful and reliable measures of typically developing (TD) children's language abilities (Dale, 1991; Dale, Bates, Reznick, & Morisset, 1989). However, little is known about their validity in Autism Spectrum Disorder (ASD).

Objectives:

The present study aimed at answering the following research question: Do the language reports of parents of children with and without ASD reliably predict their children's language abilities?

Methods:

A total of 47 parents and their children (31 boys and 16 girls) participated in the study. The sample followed a one-to-one caregiver-child correspondence (i.e., only the primary caregiver filled out the parent questionnaire) and comprised three groups. The ASD group consisted of 16 caregivers and their 16 children (2 females) with a diagnosis of ASD; the HR group consisted of 13 caregivers and their 13 children (7 females) at High Risk for ASD (by virtue of having an older biological sibling with ASD), and 18 caregivers and their 18 children (7 females) conform the TD group.

The Merrill Palmer-Revised Expressive Language Parent Form (MPR Parent Form) and the Merill Palmer-Revised Expressive Language Evaluator Form (MPR Evaluator Form) were used as measures. Caregivers filled out the MPR Parent Form and a clinical psychologist assessed children’s language abilities with the MPR Evaluator Form a year later. The use of the same standardized developmental battery allowed the comparison between the scores provided by parents and clinicians on the same measure (i.e., expressive language skills).

Linear regression was employed to determine whether the scores in parent reports reliably predict children’s expressive language abilities as measured by a clinical psychologist a year later.

Results:

Results show that scores of the MPR Parent Form reliably predict the scores of MPR Evaluator Form (R² = .41, F (3, 43) = 10, p = < .001) (see Figure 1). Results also revealed statistically significant group differences between the ASD and TD groups (t= 3.45, p = .001) but not between the HR and the ASD groups (t= .60, p = .54).

Conclusions:

Our findings suggest that parent reports are a reliable measure of expressive language abilities in ASD as well as in TD.

430.049 (Poster) Profiles of Acoustic Diversity during Autistic Children's Natural Conversations


Background: Autism is a heterogenous collection of behaviors that has been historically pathologized, with limited attention paid to the unique profiles of subgroups within this population. Even after attempting to manufacture homogeneity by restricting variables such as age and IQ within study samples, autistic youth still behave very differently across settings (e.g., language skill as measured by a standardized vocabulary test versus a lunchtime conversation with peers). Autistic prosody, a core component of verbal communication, is especially understudied in naturalistic contexts. This study uses a latent class modeling approach to parse acoustic heterogeneity in the spontaneous conversations of autistic youth, with the goal of identifying acoustic profiles that can be used to develop personalized, evidence-based supports to improve social communication outcomes.

Objectives: This study utilizes an exploratory data-driven, latent class approach to identify homogeneous patterns of speech acoustics that characterize subgroups of autistic youth over the course of a short, naturalistic conversation.
Results: A 3-class model provided the best fit for the data and revealed evidence of homogeneous subgroups with (1) Steady (N=31), (2) Increasing (N=6), and (3) Decreasing (N=13) numbers of speech utterances classified as ‘autistic’ over the course of the conversation (Figure). Group intercepts differed significantly, with the Decreasing subgroup producing significantly fewer utterances classified as ‘autistic’ at the start of the conversation (coefficient=-1.42, Wald test=-3.94, p<.0001). Members of the Increasing subgroup produced growing numbers of utterances classified ‘autistic’ over time (coefficient=.45, Wald test=2.77, p<.01), while the relationship between time and ‘autistic’ utterances was not significant for the Steady or Decreasing subgroups. Class members did not differ on age, sex ratio, IQ estimates, ADOS-2 calibrated severity scores, or SCQ scores, but did differ on word count (Increasing > Steady > Decreasing; est: -58.05, t= -2.40, p=.02), conversational turns (Increasing > Steady > Decreasing; est: -4.74, t=-2.36 , p=.02), and acoustic metrics (Table).

Conclusions: Machine-learning classification of speech utterances renders it possible to parse heterogeneous samples into more homogeneous subgroups that represent how behavior can change dynamically over the course of a conversation, even for demographically matched subgroups. In this exploratory study, we found three subgroups of youth that sound more or less ‘autistic’ over time, with the most talkative group sounding increasingly ‘autistic’ over 5 minutes. This profiling approach holds promise for identifying subgroups that benefit from specific interventions and stands to advance the goal of personalized medicine.

430.050 (Poster) Profiles of Autistic Adults with a Significant Early Interest in Reading
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Background: Autism spectrum disorder (ASD) is sometimes characterized by a strong interest in skills related to print materials and reading, sometimes called “hyperlexia,” shown by ~20-35% of autistic individuals (Klin et al., 2007; Meilleur et al., 2015). While research suggests that special interests and skills are maintained into adulthood (Collis et al., 2022), little work has examined how early reading manifests in adulthood.

Objectives: The current study examines adult outcomes of early print/reading interests, and how this interest in reading is associated with adult autistic symptomatology and with language-related interests and skills.

Methods: A total of 193 adults participated in an online (Prolific) survey (Table 1): (1) autistic individuals with a self-reported early interest in print or reading (autistic+reading; n=50); (2) autistic individuals with no interest in print (autistic-only; n=93); and (3) non-autistic (NA; n=50) individuals. Participants completed a series of questionnaires regarding sociodemographic characteristics, childhood and current reading habits, the Author Recognition test (a measure of reading frequency), restrictive and repetitive behaviors, other-language proficiency, and the Autism Spectrum Quotient Questionnaire (AQ).

Results: Of 143 autistic individuals, 50 (35%) endorsed a strong or unusual interest in letters or reading at an early age; compared to the NA sample (30%; 15 of 50), the difference was not significant, p=.52. On average, the autistic+reading group reported reading words by 3.8 years old, which was numerically but not significantly younger than the NA group (4.5 years old), F(1,63)=3.1, p=.08. A large portion (42%; 21/50) of the autistic+reading group reported learning to read without explicit instruction, compared to only 20% (3 of 15) in NA, though the difference was not significant, p=0.12. Both the autistic+reading group and autistic-only groups reported stronger circumscribed interests in adulthood than the NA group; Table 1. The autistic+reading group and NA group spent significantly more time reading than the autistic-only group; they also reported reading more complex materials and enjoying reading more. The autistic+reading group was familiar with significantly more authors than the autistic-only group. Interestingly, an association between time spent reading, and ASD symptoms was significant in the autistic-only group and missed significance in the ASD+reading group; Table 2. The early-reading autistic group showed no increased language-learning proficiency.

Conclusions: Autistic individuals with a strong early history in print materials learned to read at an early age (3.8 years), often without explicit instruction, and continued to show an interest in reading as adults, engaging with more complex reading materials, and enjoying reading significantly more than autistic peers without this history. A negative correlation between autistic symptomatology and time spent reading hours, observed in the autistic-only but not the autistic+reading group, may suggest that reading serves a different purpose in this group and provides more pleasure. An early interest in print may have long-term positive effects in autism, by providing an enjoyable and cognitively-stimulating outlet for leisure or work.
430.051 (Poster) The Relationship between Form and Function Processing of Prosody in Autism Spectrum Disorder – Evidence from Mandarin and English Speakers

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Background:

Studies on how the form versus function aspect of prosody is processed by autistic individuals have mainly focused on speakers of non-tonal languages (e.g., English), and have produced equivocal results. While the samples’ heterogeneous cognitive abilities may be possible contributing factors, the phenotype of prosodic processing in autism may also vary with one’s language background.

Objectives: N/A

Methods:

To explore this possibility, in Experiment 1, we investigated prosodic processing at the form and function levels in 38 autistic and 32 non-autistic speakers of Mandarin, a tone language, while controlling for their musical training experience and cognitive abilities. Participants completed a lexical tone task and an intonation perception task, each containing a function condition and a form condition. In Experiment 2, as a comparison, we examined form processing of prosody in 27 autistic and 52 non-autistic English speakers using the same set of Mandarin tasks.

Results:

The main results from Experiment 1 suggested that the abilities to discriminate lexical tone and intonation were not impaired at either the form or function level in autistic Mandarin speakers, and that these abilities were positively associated with one another in both autistic and non-autistic groups. Additionally, the more severe the ASD symptoms, the worse the form- and function-level of prosodic processing, and musical training experience and cognitive abilities were significantly correlated with prosodic performance for the autistic group mainly. Furthermore, while enhanced prosodic processing has been found in a subgroup of autistic participants, it may not be a general characteristic of the autistic population even for those with long-term tone language experience, as evidenced by the comparable performance between autistic and non-autistic groups. Results from Experiment 2 corroborated the finding of unimpaired form processing of prosody in English-speaking autistic participants across all tasks.

Conclusions:

The present findings reveal typical prosodic processing at both the form and function levels in autism across Mandarin and English speakers and provide evidence for associated pitch processing abilities across levels.

430.053 (Poster) Spatial Language and Cognition in Young Autistic Children

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Background: The development of spatial language – the lexical domain describing the features, locations, and relations of and between objects in space – has garnered considerable interest in the neurotypical (NT) literature as an intersection point between linguistic and nonverbal visuospatial skills. Autism spectrum disorder (ASD) is associated with relative strengths in the visuospatial domain but varying abilities in the linguistic domain. This uneven profile has motivated a small number of recent studies to begin investigating spatial language and its relationship to nonverbal spatial cognition in ASD. These previous findings suggest parallels between spatial language and spatial cognition in older autistic individuals, but no research to date has examined this relationship in young autistic children, who on average experience language delays in early childhood. Predictors of spatial language production identified in previous work with older autistic individuals and NT preschoolers include ASD symptom severity and parent spatial language input, though it is not yet known if these factors are relevant to early spatial language development in ASD.

Objectives: The purpose of the present study was to investigate the connection between children’s spatial language production and nonverbal spatial cognition over time during the preschool years. We also examined two potential predictors of spatial language observed in previous literature, ASD symptom severity and parent spatial language input.
Methods: In past work investigating spatial language in NT children of the same age, parent-child interactions have been a primary context for study. Therefore, in the present study, we analyzed transcripts of dyadic naturalistic play interactions between 129 autistic children and their parents over three time points from age 30 to 66 months and administered standardized cognitive and ASD diagnostic assessments at each visit. Transcripts were coded for total spatial word production of children and their parents and “other” (non-spatial) word production. Mullen Scales of Early Learning Visual Reception T-Scores were used as our measure of nonverbal spatial cognition. ASD Symptom Severity was measured by Autism Diagnostic Observation Schedule (ADOS) Calibrated Severity Scores (CSS). Linear mixed-effects models were fit to answer each research question, including “other” (non-spatial) child and parent language as a covariate.

Results: Children’s spatial language production was related to their nonverbal spatial cognition abilities even when accounting for overall language production (Figure 1). Parent spatial input (but not ASD severity) significantly predicted children’s spatial language production over and above the effect of overall language production (Figure 2).

Conclusions: Spatial language is associated with spatial cognition in young autistic children and appears to reflect the interaction of overall linguistic skills and nonverbal spatial cognitive ability regardless of autism severity. Results suggest parent-mediated interventions may be a promising context for increasing spatial language in autistic preschoolers. Targeting spatial language in intervention could also translate to improved academic achievement by bringing children’s attention to spatial features and concepts foundational to learning in science, technology, engineering, and mathematics (STEM), so it will be critical to examine whether parent training can increase spatial language abilities in autistic children in future research.

430.054 (Poster) Speech Timing Is Linked with Language Difficulties in Autistic and Non-Autistic Children

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Background: Prosody, otherwise known as suprasegmental features of speech, includes the intonation, rhythm, and timing of spoken communication. As prosody is an important aspect of pragmatics and social communication, prosodic differences in autistic individuals compared to typically developing (TD) peers are commonly observed. However, these differences have not been clearly quantified, resulting in a lack of understanding of not only how certain prosodic features may differ in autism, but also which particular prosodic features differ (i.e., pitch versus timing). Evidence that timing impairments are vulnerabilities across neurodevelopmental disorders, including autism and developmental language disorder (DLD), suggests timing features of prosody may be particularly sensitive to language ability. However, studies of prosodic differences in autism have not examined prosody’s relationship to language abilities.

Objectives: Characterize prosodic differences among autistic children with and without language difficulty, children with DLD, and TD children, and examine for any sex differences in the prosodic profiles.

Methods: This retrospective analysis included 38 TD children (24 male, \(M=10.3\) years, \(SD=2.27\)), 25 autistic children without language difficulty (ASD; 23 male, \(M=11.2\) years, \(SD=3.35\)), 7 male autistic children with co-occurring language difficulties (ASD_DLD; \(M=11.3\) years, \(SD=2.36\)), and 20 children with DLD (15 male, \(M=11.3\) years, \(SD=2.75\)). Language sample recordings were elicited and transcribed from the ADOS-2’s “Telling a Story from a Book” task. Children’s utterance durations and /f0 (pitch) measures (mean, range and standard deviation) were extracted using Praat. Speech rate (syllables per second) was separately derived for each child. Clinical Evaluation of Language Fundamentals (CELF) and Kaufman Brief Intelligence Test (KBIT) scores were obtained to assess children’s language skills and nonverbal intelligence.

Results: One-way ANOVAs revealed a significant main effect of diagnostic group on children’s speech rate, \(F(3,86)=4.24, p<0.01\). Post-hoc analyses revealed that TD children’s speech rate was significantly faster than the ASD_DLD and DLD groups, \(p’s<0.05\) (see figure). There were no significant main effects of diagnostic group on /f0 metrics. These results were stable with ANCOVAs controlling for sex. These ANCOVAs additionally revealed a main effect of sex on /f0 variation, \(F(1,85)=4.24, p=0.05\), where male children’s pitch varied more than female children’s. Partial correlations controlling for age, sex, and nonverbal intelligence revealed significant relationships between speech rate and children’s CELF Core Language Scores (CLS) in children without language difficulty (TD/AOD collapsed) and children without autism (TD/DLD collapsed), as well as significant relationships between /f0 variation and CELF CLS in children with language difficulty (DLD/ASD_DLD collapsed).

Conclusions: Results suggest timing aspects of prosody, such as speech rate, may be sensitive to detecting language differences among autistic and non-autistic children. The sex difference in pitch variation warrants further examination of sex differences in the prosodic profiles of these populations. Given the heterogeneity in both autism and DLD, better understanding of the relationship between language skills and prosody in these populations will help to better characterize and quantify prosody in autism. Future directions include investigating relationships between prosody and social communication skills and additional timing features of prosody, such as speech rhythm and pause counts/durations.
Background: Attenuated communication is a common and central symptom of autism spectrum disorder (ASD). One of the most common diagnostic methods, the Autism Diagnostic Observation Schedule (ADOS®, Lord et al., 2000), highlights that both changes in prosody and speech rate may indicate ASD. Previous studies have found higher and more varied pitch in autistic people (Fusaroli et al., 2017) and a decrease in the variation of intensity (Ochi et al., 2019). Recently, Lahiri and colleagues (2022) used interpersonal synchrony of spectral, prosodic and lexical features to distinguish between autistic and non-autistic children.

Objectives:

In the current study, we quantify differences in communication between autistic and non-autistic adults on the individual and the dyadic level (Bone et al., 2015). These differences could provide a marker for autism in adults, similarly to findings in children (Lahiri et al., 2022).

Methods:

We analysed the data of 40 dyads of which 14 were control dyads and 26 were heterogeneous and included an autistic participant (autistic: 6 women, age \(M = 32.11, SD = 11.04\); non-autistic: 33 women, age \(M = 30.93, SD = 10.44\)). All dyads engaged in two 10-minute naturalistic conversations, one where they discussed their hobbies and one where they collaboratively planned a meal requiring more back-and-forth between participants (Georgescu et al., 2020). We used praat (Boersma et al., 2021) and the “uhm-o-meter” (De Jong et al., 2021) to extract speech (pitch and intensity) and turn-taking (turn-taking gap, pause-to-turn-ratio, number of turns) features. We used the speech features to calculate each participant’s tendency to adjust their pitch and intensity to the previous turn (turn-based synchronisation). We will use a Support Vector Machine (SVM) with stratified nested k-fold cross-validation to classify dyads based on these features.

Results:

Control and heterogeneous dyads differed in the length of their turn-taking gaps in the mealplanning condition with control dyads reacting faster. Additionally, control dyads had a decreased pause-to-turn ratio, meaning that they took fewer pauses than heterogeneous dyads. There was no difference between dyads in the average number of turns, however, both types of dyad exhibited significantly more turns in the mealplanning condition. Last, we investigated whether there were differences between non-autistic and autistic participants in their tendency to adjust their pitch and intensity to the previous turn. This turn-based synchronisation of pitch was significantly higher in non-autistic participants, but there was no difference between groups for turn-based synchronisation of intensity.

Conclusions:

The people communicating with each other heavily influence dyadic communication. In this study, we have compared two naturalistic conversations between either two non-autistic or one non-autistic and one autistic participant. Our results show a difference of both individual and dyadic features of communication. Turn-based features, especially turn-taking gap and pause-to-turn ratio, also showed a difference mainly in the mealplanning condition. This indicates that differences are more prominent if the conversational setting requires the participants to work collaboratively. Lastly, non-autistic participants showed increased turn-based synchronisation of pitch compared to autistic participants. This mirrors results on other aspects of interpersonal synchrony, for instance motion synchrony.
Objective: To support efforts to design research studies driven by SLPs’ real-world service priority this study aimed to better understand community SLPs’ perspectives on where they believed researchers should focus their efforts. This knowledge can be used to establish research priorities, inform future research strategy, and signal opportunities for collaborative research, thereby advancing SLPs’ practice with autistic children.

Methods: We used an online survey to collect qualitative data from SLPs providing services to preschool children with suspected or diagnosed autism in Ontario, Canada. Participants provided demographic information then responded to the following open-ended questions: What specific research aims should we try to achieve? What clinical problems should we try to solve? What possible solutions should we pilot test? What should be the focus of our research? An inductive, reflexive thematic analysis approach was used to identify patterns of meaning across SLPs’ responses. This method is well suited to answering questions related to people’s experiences (Braun & Clarke, 2012; 2020). To promote credibility and trustworthiness of findings, our research team worked reflexively to control how prior knowledge influenced interpretation of the data.

Results: 131 participants from across the province, with varying degrees of clinical experience working with autistic clients responded to the survey questions. Responses were categorized into three main categories: partnerships, service delivery, and clinical effectiveness. Within each category, we identified 3-4 themes. For each theme, we report on aims to achieve and problems to solve, solutions that should be tested, and research questions to investigate.

Conclusions: This study provides an initial exploration of SLPs’ perspectives on the aims, solutions, and research questions that researchers should pursue to improve real-world SLP service delivery for autistic preschoolers. Participants’ views were complex and wide-ranging yet told a highly patterned story of the overarching aims they believe researchers should focus their efforts on. These included, testing and implementing systems/processes designed to promote collaboration across health professionals (and communities), and generating evidence based clinical decision-making processes and tools, that support efforts to provide equitable, needs-based services.

430.057  (Poster) Stability and Change in Lexical Features: A Longitudinal Telephone-Based Study of Autistic Children

Background: Prior research highlights numerous aspects of linguistic behavior that distinguish autistic and neurotypical children. For example, autistic children tend to use fewer epistemic verbs (e.g., “think”, Tager-Flusberg, 1993) and psychological state terms (e.g., “happy”, Weismer et al., 2011) compared to neurotypical peers. Autistic children also use more nouns during storytelling, suggesting object-focused language production (Boorse et al., 2019). However, longitudinal studies are necessary to determine whether language differences in autistic and neurotypical children are stable over time and across elicitation contexts.

Objectives: Determine whether lexical differences in autistic and neurotypical speech are stable over time, and whether they vary by elicitation context.

Methods: A preliminary sample of autistic (n=17, 12 boys, Mean age=9.33±2.3 years) and neurotypical (n=15, 6 boys, Mean age=10.46±2.7 years) children matched on IQ participated in a home-based longitudinal study over the telephone once a week for seven weeks (results from the final sample of 48 participants will be reported in May, 2023). Using Linguistic and Word Count (LIWC) text analysis software, matching game and picture description samples from the first three sessions were analyzed for the following variables: word count; and the LIWC features: “Big” (i.e., words > 6 letters long); “Analytic”; “Authentic”; “Cognition”; “Affect”; and “Social” words. These categories were chosen based on prior literature suggesting potential group differences in mentalizing language. We constructed linear mixed-effects regression models to track longitudinal changes across sessions by task, with individual participants and age included as random effects. Since groups were not matched on sex ratio, we included sex as a covariate. Finally, we compared children’s word frequency during the picture description task using the weighted log-odds-ratio informative dirichlet prior algorithm (Monroe et al., 2009).

Results: In the matching game (Fig.1), autistic children produced fewer total words (β=-93.20, p=.009) and “Big Words” (β=-2.08, p=.032) than neurotypical peers, and had lower “Analytic” scores (β=-16.17, p=.037) and higher “Authentic” scores (β=20.15, p=.021). Total words and “Big Words” increased in later sessions for both groups (β=69.74, p=.041 and β=11.59, p=.042, respectively), while “Authentic” scores decreased (β=20.15, p=.021). Autistic children also increased their “Social” word production over time, while neurotypical children decreased (β=-2.06, p=.021). There were no group differences in “Cognition” or “Affect” words. For the picture description task (Fig.1), only “Authentic” talk differed by group; again, autistic children had higher “Authentic” scores than neurotypical children (β=15.24, p=.036). Analyses of word frequency (Table 1) revealed that autistic children produced “then” as the most frequent word relative to neurotypical children; more than half (68.85%) occurred as part of a coordinating conjunction or discourse marker (“and then”). On the other hand, neurotypical children produced “like” as the most frequent word, used overwhelmingly as a discourse marker (85.04%).
Conclusions: This study showed that lexical differences in autistic and neurotypical children vary over time and are sensitive to task demands. Analyzing word frequency sheds light on children’s underlying thought processes during natural speech. In the future, frequent at-home language samples could serve as a useful tool for monitoring subtle changes in autistic children’s social communication.

430.058 (Poster) Studies Pertaining to Language Impairment in School-Age Autistic Individuals: A Systematic Review


Background: Language in autism is widely heterogeneous, with significant variation in receptive-expressive language profiles. In addition, diagnosis of autism spectrum disorder (ASD) no longer requires a language delay, such that autistic individual can have co-occurring language impairment. Oftentimes, clinicians and scientists commonly use age-referenced assessments and research findings to qualify school-aged individuals for services and to characterize their language profiles. However, how studies assess the dimensions of language pertaining to language impairment and defines to language impairment hinders our understanding of language phenotypes. To address this gap, this systematic review examines reporting practices for language skills using age-referenced assessments in autistic individuals.

Objectives: This review asked two primary research questions: What are the reporting patterns of LI in ASD prior to and after publication of the DSM-5? How does the literature characterize the language abilities of autistic individuals with respect to LI using age-referenced assessments?

Methods: The authors preregistered this systematic review with PROSPERO (CRD42021260394) and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol. Database searches took place on August 11, 2021, with an updated search on September 20, 2022, and included Linguistics and Language Behavior Abstracts, PsycINFO, PubMed, and the Directory of Open Access Journals from 1980 to 2022. Search terms included three essential concepts: autism, language, and age. Two coders independently screened and evaluated articles, discussing any disagreements until they reached consensus.

Results: Searches yielded 60 qualifying studies, with 25 studies (42%) directly addressing LI in ASD. Studies varied in how they operationalized and determined LI status, with no discernible differences by DSM version. Findings indicated variable language profiles in autistic individuals with and without LI.

Conclusions: A systematic review of studies of LI in autism, focusing on ages 3-21, indicates inconsistent operationalization of LI and age-referenced assessments used to characterize the language abilities of autistic individuals. Interpreting research on LI in autism requires careful attention to diagnostic and grouping criteria. Better understanding the variability in the language skills of autistic individuals with LI may enhance understanding of phenotypic variability and contribute toward development of efficacious supports.

430.059 (Poster) Testing the Labeling Effect in Autistic Children

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Background:

Children presented with two or more objects that receive the same label expect that such objects share the same non-obvious properties (e.g., a sound that one of the objects makes). Such expectation is reversed when objects receive distinct labels: children expect differently named objects to have different non-obvious properties. Linguistic labels thus induce children to generate concepts aligned with linguistic categories.

The labeling effect has been robustly tested using different paradigms in neurotypical children of different ages, from 10 months (Dewar & Xu, 2010) to 11 years (Sloutsky & Lo, 1999), but there has been little discussion about its relation to cognitive, social or linguistic abilities, although Pickering et al. (2018) relate labeling to cooperation.

The effect has not been tested on autistic children, who might not generate concepts on the basis of labeling alone, given difficulties in generalization and communication. This entails that their concepts might not get aligned with those of their linguistic community.

Objectives:
We replicate an experiment by Graham et al. (2013) with TD children. Children are invited to manipulate an object after a presentation of another one that makes a determinate sound. This kind of action-oriented paradigm seems appropriate for autistic children with low verbal abilities.

Methods:

30 autistic children are divided into two groups: same label (SL) and distinct label (DL). Children in the SL group are presented with pairs of unknown objects in three conditions: (i) [Predicted]: the experimenter labels one of the objects with a name, shows how to extract a sound from it, and gives the child the other object while making it clear that it has the same name as the first one. The second object makes the same sound as the first object; (ii) [Unpredicted]: same as [Predicted], except that the second object does not make the expected sound; (iii) [Baseline]: the experimenter labels the first object without acting upon it and gives the child the chance to explore the second object.

Children in the DL group receive objects in the same three conditions as in SL, but the experimenter insists that the second object has a different name.

Number of actions on the second object are counted, and two conditions are compared: (i) [Unpredicted SL], where expectations are violated because the second object is disabled, and [Predicted DL], where expectations are not violated because the second object (with a distinct label) is disabled.

Results:

We fitted a mixed effects model with number of actions on the test object as a dependent variable, group (SL / DL), condition (Baseline / Predicted / Unpredicted) and an interaction between group and condition as explanatory variables, and participant and label as random effects, which yielded a main effect of group (p = 0.009). In pairwise comparisons, we also encountered a significant difference between unpredicted SL and predicted DL (p = 0.004), which replicates the results by Graham et al. (Figure 1).

Conclusions:

Results of the study suggest that autistic children are sensitive to the cognitive effects of acts of labeling.

430.060 (Poster) The Acquisition of Mental Stat Verbs in Children with Autism Spectrum Disorder
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Background: Mental state verbs (MSV) are part of the primary language instruments people use to describe the knowledge, thoughts, feelings and desires of themselves and others and are divided into six semantic categories: desires, emotional, cognitive, physiological, perception and moral verbs (Bretherton & Beeghly, 1982; Shatz et al., 1983). These verbs begin to appear in children's language at 18 months, and they develop in production and comprehension in terms of frequency, diversity and pragmatic use through childhood and into primary school age (Bartsch & Wellman, 1995; Pascual et al., 2008). As compared to typically developing children (TD), children with Autism Spectrum Disorder (ASD) tend to use less MSV (e.g., in various narrative tasks, Brown et al., 2012; Rumpf et al., 2012; Siller et al., 2014).

Objectives: The current study aims to describe the developmental process of MSV from different semantic categories in children with ASD compared to TD children.

Methods: For this purpose, we developed a MSV parental questionnaire measuring the diversity of MSV in children's lexicon from the age of 1.5 to ten years old. The questionnaire contains 80 MSV from five categories (desires, emotional, cognitive, physiological, and perception. Moral verbs are included in the Hebrew version in the other categories), and a sixth category of 10 physical verbs as a control (Eilon & Novogrodsky, 2022). Using an online questionnaire, 29 parents of children with ASD aged 3-10;07 years participated in the study and filed the MSV questionnaire about their child. In addition, 95 parents of TD children aged 3-10;01 filed the questionnaire. Both groups were divided to preschool children (aged 3-6) and school-age children (aged 6-10).

Results: Across the six types of verbs, results showed main effects of age (F(1,1)=50.33, p<0.0001) and group (F(1,1)=28.22, p<0.0001), meaning that older children used more different verbs than younger children and TD children used more diverse verbs than ASD children. No significant effect of interaction was shown. The effect of age maintained significance in all semantic categories, showing the growth in the diversity of verbs in each MSV category with age (see figure 1 below). The group effect reached significance only in the cognitive, emotional, desires and physiological verbs, showing that TD children scored significantly higher than ASD children. The effect of group in the physiological verbs was surprising, as both groups scored high in this category, and it might be explained by ceiling performance of the TD group in both age groups.
Conclusions: The finding highlights the difficulty of children with ASD in cognitive, emotional, and desires verbs. Previous studies have argued that MSV use and the sequence of verb acquisition (from the desire category to the knowledge and belief-cognitive category) in TD children reflect the Theory of Mind (TOM) of the developing child (Tardif & Wellman, 2000). Furthermore, children with ASD tend to have difficulty in the understanding of TOM (Baron-Cohen et al., 1986). Our findings support and tie these two claims, showing the specific deficit children with ASD have in verbs that reflect the understanding of the mind.

430.061 (Poster) The Emotional Valences of Passive Sentences in Japanese Perceived By Adults with ASD: An Interim Report

Background: Lartseva et al. (2015) point out that "...individuals with ASD are able to correctly identify words, sentences or stories as emotionally positive or negative". However, it is not yet clear whether individuals with ASD can accurately classify them into positive or negative in a Japanese cultural context.

The Japanese language has two types of passive voice sentences: 1)direct passive sentences which clearly convey either a positive or negative meaning; 2)indirect passive sentences which are more difficult to interpret requiring the listener to infer the speaker’s emotions, which are often times negative, coupled with the difficulty caused by occasional ellipsis of the subject. In addition, there is another type of passive sentences with inanimate subjects which are neutral in meaning.

Objectives: The purpose of this study is to clarify the emotional values that adults with ASD feel about four types of passive sentences including direct passive sentences with positive, negative, or neutral meanings, and indirect passive sentences, in order to explore possible difficulties they experience in daily communication. The experimental group had 11 ASD adults(age range:17-52) and the control group had 106 university students.

Methods: Following Yorozuya et al.(2020), we measured the emotional values of four types of passive sentences. The participants marked the strength of their feelings concerning each sentence on a straight line ranging from negative to positive meanings (the visual analog scale: VAS). Emotional values were measured by the distance from the center point (neutral) to the mark the participants made. The mark distance values were converted by 2-centimeter intervals into a five-point scale ranging from 1 to 5.

Results: Among the four types, only the indirect sentences showed difference between the ASD group and the control group(medians: 2 and 3), whereas the other three types showed no difference. A further analysis of U test showed a significant group difference for the indirect passive sentences(U(176,1696)= 133809.5, p =0.016). Also a U test of each of the 16 sentences revealed two sentences showed significant differences(U(11,106)= 377.5, p=0.022 U(11,106)=349, p=0.018)(Table 1). On the other hand, in terms of average ranks, the ASD group was higher than the control group for 11 sentences, and lower for 3 sentences. In terms of median, the ASD group was higher for 3 sentences and lower for 2 sentences, whereas the two groups’ medians were equal for the other 11 sentences(Table 1).

Conclusions:

Among the four types of Japanese passive voice sentences, indirect passive sentences showed a significant difference between the ASD group and the control group, which contradicts with what Lartseva et al.(2015) pointed out does not apply to Japanese indirect passive sentences.

A U test and a comparison of medians revealed that overall the ASD adults felt the indirect passive sentences were “less negative” than the control group did. Lastly it is noteworthy that further research is needed since in terms of average rank and median the ASD adults felt the opposite feelings to the overall trends about some sentences.

430.062 (Poster) The Low Verbal Investigatory Survey for Autism (LVIS): Psychometric Properties from a Large and Diverse Sample of Autistic Participants
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Background: Approximately 30% of autistic children are minimally verbal. Improved methods are needed to determine which children are at greatest risk for MLV outcomes to optimize interventions and assess response to treatment. However, the field lacks measures of communicative capacity among minimally or low verbal (MLV) autistic children. We recently demonstrated promising psychometric properties for the Low Verbal Investigatory Survey (LVIS), a brief parent-report measure evaluating communicative capacity among MLV autistic children, in a sample of 147 participants (Naples et al., in press). We found that two latent factors, Verbal Communication (e.g.,
regular use of words and phrases) and Atypical Communication (e.g., echolalia, reduced prosody), were associated with communicative performance on standardized measures.

Objectives: To assess the psychometric properties of the LVIS in a large diverse sample of autistic individuals to test whether: (1) the latent factor structure replicates in a larger, more diverse sample; (2) the measure yields convergent and divergent validity; and (3) scores on the LVIS differ as a function of sociodemographic factors.

Methods: A sample of 826 English-proficient parents were recruited via the Simons Foundation Autism Research Initiative (SPARK Consortium, 2018) and completed an online survey. Parents completed the LVIS, along with questionnaires probing sociodemographics and adaptive functioning (Vineland Adaptive Behavior Scales, Third Edition; VABS-III). IQ was collected from record review. Principal components analysis (PCA) assessed LVIS factor structure; convergent and divergent validity were assessed for all derived factors.

Results: In addition to the two factors reported previously, a third factor was retained in PCA based on Eigenvalues (range for Factors 1 to 3: 1.99 – 4.81, Factors 4 and above <1.4) and scree plot. Loadings on factors 1 and 2 (Verbal Communication and Atypical Communication) were comparable to previous findings; Factor 3, Nonverbal Communication, reflected variability in pointing behaviors. As predicted (OSF pre-registration), Verbal Communication was more strongly associated with VIQ, \( r = .71, p < .001 \), than NVIQ, \( r = .50, p < .01 \). Neither Atypical Communication nor Nonverbal Communication were associated with IQ (\( p 's > .1 \)). Similarly, VABS-III scores were correlated with Verbal Communication, \( r = .67, p < .001 \), but not Atypical Communication or Nonverbal Communication (\( r > .1 \)). Verbal Communication differed as a function of parent-reported verbal status (“would you describe your child as minimally verbal,” \( p < .001 \). Neither Atypical Communication (\( p = .81 \)) nor Nonverbal Communication (\( p = .11 \)) differed by verbal status; Figure 1. None of the three LVIS factor scores differed as a function of sex, \( p 's > .30 \). Preliminary analyses suggest that Verbal and Nonverbal Communication (but not Atypical Communication) differ as a function of race and ethnicity; this will be further explored in future analyses.

Conclusions: These findings provide strong validation of a tool designed to capture multiple dimensions of communicative capacity in autistic children with minimal or low verbal skills. Discussion will address factors beyond communication abilities that may influence racial and ethnic disparities in scores, including item-wise bias. The LVIS has the potential to provide information that has immediate relevance both clinically and for research.

430.063 (Poster) The Q-Social: A New Questionnaire Measure of Social Communication in Young Autistic Children

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Background: Social communication is a major target for early interventions provided to autistic children. Social communication is among the most frequently measured endpoints in early intervention trials, yet existing social communication outcome measures have major limitations (Anagnostou et al., 2015). These limitations include limited construct coverage, few items tapping skills in children with limited language, high burden of administration, and limited sensitivity to short-term or incremental change. Moreover, many of the tools currently in use for measuring social communication either (1) explicitly measure autism “symptoms,” without regard to which or these are most important as treatment targets, or (2) were not designed for an autistic population, meaning that autism-typical behaviors and concerns may not be well-represented. Thus, there is a pressing need for a social communication outcome measure that is efficient to administer, sensitive to change, and tailored to the unique needs of young autistic children.

Objectives: This presentation describes the development and initial validation of a new questionnaire measure of social communication, the Questionnaire for Social Communication in Young Autistic Learners (Q-SoCIAL).

Methods: The Q-SoCIAL was developed using qualitative and quantitative methods consistent with best practices in the development of patient-reported outcome measures (FDA, 2009; NIH, 2012). Initial item content was derived through a combination of information from (1) focus groups with parents, teacher, and expert clinicians, (2) review of more than 4,500 items from 93 questionnaire or interview measures tapping social-communication related constructs, and (3) review by a panel of research and clinician experts. The initial draft measure then underwent cognitive interviewing with parents (n=30) and teachers (n=29) serving young autistic children to inform addition revisions to questionnaire instructions and items. An online survey was used to collect responses to the new measure from parents (n=500) and teachers (n=250) of typically developing (TD) children to inform developmental ordering and utility of the items.

Results: The Q-SoCIAL is a new measure of social communication in young autistic children that covers expressive, receptive, and pragmatic communication skills; social engagement and interaction with peers and adults; play and imitation; and autism-specific social concerns. The Q-SoCIAL includes 149 developmentally ordered, competency-based items (rated on a 6-point scale from “Never” to “Outgrown”) and 24 “strengths and challenges” items (rated on a scale from “Never” to “Always”) that represent unique social communication challenges impacting autistic children. Initial data collection in TD children indicated that competency-based items followed a clear developmental progression, and also identified some items that may show floor or ceiling effects in the targeted age range. Autism-specific problems items showed low endorsement in the TD sample.
Objectives: The study assessed predictors of adaptive functioning by (1) examining whether cognitive ability predicts adaptive functioning in children with and without ASD, and (2) exploring whether an ASD diagnosis moderates the effects of receptive and expressive language on adaptive behavior.

Methods: This study included 196 participants who were evaluated for ASD at the UAB Civitan-Sparks Clinics, a tertiary care clinic. Data from these assessments, such as adaptive measures, were collected. Adaptive behavior was assessed using the Adaptive Behavior Composite from the Vineland Adaptive Behavior Scales-Second/Third Editions (Vineland-II/3). Receptive and expressive language were measured using the Clinical Evaluation of Language Fundamentals (CELF-P2/4/5) or the Preschool Language Scale, Third, Fourth, and Fifth Editions (PLS-3/4/5). Two hierarchical multiple regressions were conducted: Step 1: covariates; Step 2: ASD diagnosis, cognitive ability, and language ability; Step 3: the interaction between ASD diagnosis and language. Due to the multicollinearity between receptive and expressive language, they were assessed in separate regression models.

Results: In this sample, 89 participants (45%) were diagnosed with ASD, 53 (27%) were female, and the average age was 6.63 years old (SD= 3.08). After controlling for motor abilities and maternal education, cognitive ability and autism diagnosis significantly predicted adaptive functioning (p<.05). Neither receptive language nor expressive language were significant predictors of adaptive functioning (t=-.10, p=.92; t=1.41, p=.17, respectively). Both the final model with receptive language significantly predicted adaptive functioning (F(6, 185)= 12.02, p<.001, R^2=.30) and the model with expressive language significantly predicted adaptive functioning (F(6,185)= 12.29, p<.001, R^2=.30).

Conclusions: Autistic participants had significantly poorer adaptive functioning compared to those without ASD, which affirms previous research (Bal et al, 2015; Di Rezze, et al., 2019). Additionally, participants with higher cognitive ability had greater adaptive behavior. Contrary to what was expected, receptive and expressive language abilities did not predict adaptive functioning in ASD or non-ASD participants. While it has been previously demonstrated that poorer receptive language is associated with worse daily living skills (Bal et al., 2015), the current study’s findings suggest language deficits in autistic individuals may not impact adaptive behavior as a whole.

Background: Autism spectrum disorder (ASD) is a developmental disorder characterized by social impairments, communication difficulties, and restricted, repetitive behaviors. Communication deficits are a hallmark characteristic of ASD (American Psychiatric Association, 2013). Many autistic children develop language at a slower rate than typically developing children (Mitchell et al., 2006), yet there has been limited research connecting receptive and expressive language abilities to overall adaptive functioning. Language is one factor that may contribute to adaptive skills in autistic children.

Objectives: The major objective of the study was to translate, adapt and validate the Communication Matrix parent version to Sinhala. Pretesting the Sinhala translated tool was done after evaluating the validity of the tool. The primary purpose of the study was to translate, adapt and validate the Communication Matrix parent version to Sinhala. Under the validation procedure, the aim was to evaluate face and content validity. Pretesting the Sinhala translated tool was done after evaluating the validity of the tool.
General objective – To translate, adapt and, validate Communication Matrix parent printable version from English to the Sinhala language.

Specific objectives

- To cross-culturally adapt and translate Communication Matrix parent version into the Sinhala language.
- To evaluate the face and content validity of the Sinhala version of the Communication Matrix parent version.
- To pre-test the translated tool with parents of children who have complex communication needs.

Methods:

The Sinhala translated version of the Communication Matrix was developed through a forward-backwards translation procedure. An expert panel of six participants including four SLTs and two linguists contributed to validate the translated tool in two rounds using an open-ended questionnaire and a four-point rating scale. Modified Delphi technique was used for this procedure. A group of ten parents contributed to pretest the translated tool by answering an open-ended questionnaire.

Results:

Suggestions were given in the expert panel round one to modify the translated tool. The face and the content validity index of the modified Sinhala translated Communication Matrix parent version was evaluated. The face validation was qualitatively done based on the answers to the open-ended questionnaire given to the expert panel. Under the content validity, the item content validity index (I-CVI) and the scale validity index (S-CVI) were measured using the four-point rating scale. Both I-CVI and S-CVI s were 1 while the total agreement of the tool was 24. Pre-testing the translated tool was also successful as the parents provided mostly positive answers to the questions.

Conclusions:

The Sinhala translated Matrix parent version is an appropriate self-administrative and objective AAC assessment that can be used in local clinical settings. Moreover, this can be used to increase the participation of parents in decision-making procedure with professionals despite their educational background to the most suitable AAC for their children. However, it is recommended to pre-test the Sinhala translated Matrix assessment with a larger number of parent group to gain more comprehensive result related to the user-friendliness of the tool.

430.066 (Poster) The Relationship between Social and Contextual Inferencing and Narrative Language in Autistic and Control Boys

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Background:

Previous research has shown that social communication is an area of vulnerability in autistic individuals. The challenges in narrative and social-pragmatic language, including inferencing, might hinder the successful communication in social situations as they both require processing of various linguistic domains, mindreading and the simultaneous utilization of contextual language. However, the relationship between narrative and social and contextual inferencing is not fully understood and needs to be studied further.

Objectives:

The aim of this study is to examine the performance of the autistic and control children in tasks measuring narrative and social and contextual inferencing and explore their connections.

Methods:

The participants were 15 autistic (aged 5;1–10;7 years) and 15 control boys (aged 5;2–10;0 years). All children were monolingual and Finnish speaking. Children’s narratives were elicited by a Cat Story which is a Finnish narrative assessment method, based on a pictorial story generation. The content of the children’s narratives was analyzed by information scores that is a combined measure of the relevant story content and the accuracy of the referential cohesion. The social and contextual inferencing was assessed by a Pragma test, which requires understanding implied meanings of utterances in a given context. Questions are presented along with short verbal scenarios and pictures or objects. There are five subcategories in the Pragma test, but only contextual inferience with Theory of Mind (ConToM) and understanding of false beliefs (FB) were included in this study. Group differences were assessed by Mann Whitney U-test and Spearman’s rho correlation was used to assess connection between narrative and social-pragmatic language measures in groups.
Results:

The control children outperformed the autistic children in ConToM ($U = 192, p = .001$) and in FB ($U = 187, p = .021$), but there was not statistically significant difference in narrative language ($U = 152.0, p = .106$). In the autistic group, there was a significant correlation between ConToM and the Cat Story ($r = .570, p = .027$) and between FB and the Cat Story ($r = .653, p = .008$). In the control group, only the connection between the Cat Story and ConTom was significant ($r = .556, p = .031$).

Conclusions:

The social-pragmatic language comprehension (i.e., ConToM and FB) was challenging for autistic children, but there was no statistically significant difference in the content of the narratives between the groups. Narrative language and social and contextual inferencing with ToM seemed to be connected in both groups. Since successful picture-based narration requires the utilization of a given context and the ability to acknowledge the story characters’ and the listener’s different perspectives and mental states, this connection seems plausible. Moreover, autistic children showed significant connections between false belief reasoning and narration. Thus, it seems that in autistic individuals mindreading skills might also support the expression of relevant story content in a coherent way. These findings might be utilized in supporting the social communication of autistic individuals, since by focusing on social-pragmatic language we might also improve narrative language or vice versa.
Background: Language requires generalization. Words differ in meaning depending on their context, and the same word can often apply in a variety of related but distinct contexts. In fact, up to 84% of English words have multiple semantically related meanings [1]. While an ability to extend known word meanings in new ways is critical to successful communication, there is reason to believe that this ability is especially challenging for autistic individuals.

Objectives: Do verbal autistic adults and neurotypical adults with similar levels of education extend word meanings to a similar extent (n = 280, preregistered)?

Methods: A Flexible Meaning Extension (FME) task required participants to extend familiar words to label semantically related objects. A Label Learning (LL) task required applying labels to objects without meaning extension. Both tasks used a 4AFC design.

Results: 80 verbal autistic adults performed above chance but significantly below 60 neurotypical peers on the FME task, while simultaneously matching neurotypical participants on the LL task. The second study replicates the same pattern in a separate group of 80 autistic adults with masters’ degrees and 60 new comparably educated neurotypical adults. The predicted interaction between group and trial type was significant at both education levels, with random intercepts for subjects and items. In both studies, autistic participants were significantly less accurate than neurotypicals on the FME task: study 1 (b = -.10, t = -4.47, p < .0001); study 2 (b = -.045, t = -5.75, p < .0001), but did not differ on the LL task.

Conclusions: These findings demonstrate that autistic adults do not extend word labels in the same ways as their neurotypical peers, providing evidence that these differences in generalizing extend to the language domain.

testing (p<0.05, 1000 permutations). Each PC was qualitatively named to aid interpretation based on the pattern of loadings on symptom measures (Figure 1).

Second, using PrimeNet, we test whether symptom axes across PCs map onto distinct FC patterns that allow prediction of behavior at the individual-subject level. Specifically, the analysis runs 1,500 iterations of a multi-level model to select FC edges (pairwise correlations) for each iteration that are associated with PC scores. The edge-features selected in each iteration are used to train single-feature support vector regression (SVR) models using leave-one-out cross-validation. In turn, we apply the trained models to held-out data across the 1,500 iterations (Figure 2). Preliminary analyses with 75 subjects show that FC parcels selected by the training model as being associated with PC1 scores (i.e., social communication skills) are located primarily within Language and Cingulo-Opercular networks. Ongoing analyses test whether these parcels are predictive of behavioral scores. Furthermore, whole-brain FC maps seeded to a language network parcel show higher cortical and subcortical FC in the ASD group.

Conclusions: Collectively, the results indicate that heterogeneous language and social communication deficits can be reduced into a low-rank symptom solution that is cross-diagnostic. These derived symptom axes are expected to map onto distinct neural patterns, which are predictive at the individual-subject level. Ongoing analyses will also assess the extent to which these neural patterns vary as a function of diagnostic group.

430.071 (Poster) Collaborating with a Level 3 Autistic Author in Order to Elucidate Hyperlexia and Relationship to Language in Non-Speaking Autistic Individuals

F. Cazalis¹, H. Nicolas¹, V. Truffert¹, A. Ena¹, K. Buttin¹ and P. Ancet¹, (1)CNRS, UMR8557, Paris, France, (2)free lance, Medreac, France, (3)CNRS UMR5319 Passages, Bayonne, France, (4)Ecole des Hautes Études en Sciences Sociales, Paris, France, (5)Université de Bourgogne, LIR3S (UMR CNRS-uB 7366), Dijon, France

Background:

Hélène Nicolas is a young French woman diagnosed with level 3 autism and severe handicap. Although she cannot speak and has never been taught how to read, she exhibits exceptional literary talents. Using cardboard letters, she has written five books published under the nom de plume Babouillec. This phenomenon raises three important questions: (1) What cognitive mechanisms allowed her to learn how to read and write by herself? (2) Once identified, could such learning processes be applied in order to elicit reading and writing in other level 3 autistic individuals? (3) Could her texts provide clues towards a better understanding of the relationship that non-speaking autistic people have with verbal language?

Objectives:

This ongoing study aims at investigating the works and thoughts of Hélène Nicolas in order to identify markers of hyperlexia in autism, as well as characterizing her worldview in order to better comprehend highly atypical forms of intelligence such as those often observed on the spectrum.

Methods:

Participative research prevailed as the only acceptable format for this study. Dialogues between Hélène Nicolas and the rest of the research team (including autistic and non-autistic persons), focusing on philosophy, cognitive science and psychological introspection, have been documented in detail. Excerpts from these conversations will be presented to other level 3 autistic persons and their reactions and feedbacks will be collected as a mean of fostering fruitful reflexivity within the research team, and also as a way to gather heuristic insights about the functioning of the autistic mind.

Results:

We have so far collected more than 20 hours of recorded conversations. For example, this dialog took place with Fabienne Cazalis:

F – researchers think that autistic persons may not experience the same emotions as non-autistic people. What is your favorite emotion?

H- Make my adrenalin burst.

F- What is the emotion that you hate the most?

H- The dark trail of adrenalin.
F- What’s your opinion about oxytocin?

H- To this, the brain answers yummy.

F- And what about testosterone?

H – Good. The world is weeping, cradled by Jupiter.

Conclusions:

This research is still going on and results are being analyzed. Temporary conclusion is that current collected conversations confirm Hélène Nicolas not only as a wordsmith but also as someone with a very astute and profound understanding of the world.

430.072 (Poster) Screening for Language Difficulties in Autism and ADHD
V. P. Mohanakumar Sindhu, A. Brignell, K. Kallady, M. A. Bellgrove and B. P. Johnson, Monash University, Clayton, VIC, Australia

Background: Children with autism spectrum disorder (autism) and attention deficit hyperactivity disorder (ADHD) have an increased likelihood of speech and language difficulties compared to their typically developing peers. The diversity of clinical presentation of autism and ADHD means there is a pressing need to identify appropriate screening tools for language difficulties in these populations. The Clinical Evaluation of Language Fundamentals 5th Edition Screening Tool (CELF-5 Screener) and expressive and receptive language subscales from the Vineland Adaptive Behaviour Scales (Vineland-3) are two instruments that are widely used and may assist in identifying these concerns.

Objectives: We examined how accurately the CELF-5 Screener and parent-rated Vineland-3 expressive and receptive language subscales can detect receptive and expressive language difficulties compared with the clinician-administered CELF-5, a comprehensive and widely used clinical tool evaluating language skills.

Methods: Our sample consisted of 112 children aged 6-14 (n=25 typically developing; n=15 autism, n=27 ADHD, and n=45 autism +ADHD). Diagnosis of all participants was confirmed by the best clinical estimate: a registered psychologist or paediatrician, and speech pathologist, collated information gathered during participation in the study, in addition to any previous clinical reports, to confirm the diagnosis (informed by comprehensive best practice assessment tools, including but not limited to the ADOS, Conners rating scale). Outcomes from the CELF-5 Screener and Vineland-3 (adaptive receptive and expressive language scores) were compared to the clinician-administered CELF-5 (receptive and expressive composite scores) using sensitivity and specificity analysis. The current data is based on a pilot study, however, recruitment, and data collection are ongoing to establish a larger sample size.

Results: Children who scored below cut off on either expressive or receptive language composite scores on the CELF-5, 67.9% had scored at or above criteria on the CELF-5 Screener (i.e., had passed), indicating poor sensitivity of the CELF-5 Screener at identifying speech and language difficulties among children with autism and/or ADHD. By contrast, the Vineland-3 missed 30.8% and 17.6% of children with expressive or receptive language difficulties, respectively. The Vineland-3 incorrectly identified expressive or receptive language difficulties in 65.1% and 41.0% of children who did not have expressive or receptive language difficulties, respectively.

Conclusions: While the use of a language screening tool is at least a first step in ruling out possible language difficulties, the administrators should be aware of the strengths, limitations, biases, and errors of the tool, especially while assessing neurodiverse children whose language development might not follow a normative trajectory. The results of screening tools and parent reports should be carefully considered, and children may require a comprehensive evaluation (clinician-administered and parent-rated measures, detailed assessment of structural, pragmatic and functional skills) of their language skills to avoid overlooking more elusive deficits.

430.073 (Poster) The Relationship between Language and Behaviours of Concern in Autistic Children
A. Farrugia1, M. McInerney2 and A. Brignell1, (1)Speech Pathology, Australian Catholic University, Fitzroy, VIC, Australia, (2)Australian Catholic University, North Sydney, NSW, Australia

Background: Language impairment and behaviours of concern (BoC), such as self-injurious behaviours and aggression, are commonly seen in autistic children. It is often assumed these two domains are associated, however the evidence to date has been inconclusive for autistic children. Furthermore, it remains unclear whether distinct components of language (i.e., receptive and expressive) may be differentially associated with BoC outcomes.

Objectives: This study investigates the longitudinal association between receptive and expressive language ability and BoC for autistic children using data from a large population-based sample.
Methods: Participants were drawn from the Longitudinal Study of Australian Children (LSAC), which follows two cohorts of children, the Birth, and the Kinder cohort. Receptive and expressive measures of language were collected at age 4 years old, including the Peabody Picture Vocabulary Test, and LSAC parent questionnaires that asked about the child's language development. The BoC outcome measure, Strengths, and Difficulties Questionnaire – Conduct Problems subscale, was collected at ages 8 years. Correlation and regression analyses were conducted, with the following covariates included in analyses: socio-economic status, non-verbal IQ, age, gender, pro-sociality (e.g., peer socialisation) and peer problems.

Results: In total, n=145 children (79% male) were reported by their parents to be autistic in the Birth cohort and n=92 (80% male) in the Kinder cohort. No significant association was found between receptive or expressive language ability at 4 years (for all language measures) and BoC at 8 years for both cohorts of autistic children (P=0.05 for all analyses). Two covariates, non-verbal IQ (β=−0.284, P=0.004) and pro-sociality (β=−0.257, P=0.008), were significantly associated with BoC for the Birth cohort, contributing to 14% of the variance in BoC outcomes.

Conclusions: BoC can have a significant impact on an autistic child and their family’s quality of life and their participation in community, education, and employment. An understanding of the factors that may contribute to BoC outcomes is critical for prevention and prognostic counselling. Our findings highlight factors other than language may contribute to BoC outcomes for autistic children. Variables such as peer socialisation and non-verbal IQ may be important considerations for screening, assessment, and intervention targets. Findings from this population-representative sample provide an important counterpart to those of existing studies that have utilised selected and clinically ascertained samples.

430.520 (Poster) Sex-Differentiated Linguistic Predictors of Conversation Quality in Autistic Children


Background: Social challenges manifest differently in autistic girls compared to boys. However, the field has been slow to pinpoint sex differences in objective markers of social communication, such as conversational speech patterns in naturalistic settings. Prior research has shown that young adults rate autistic girls higher than autistic boys on a brief measure of conversation quality (Cola et al., 2020), and autistic girls differ from boys on several speech dimensions, such as speech rate and response time (Cho et al., in prep). The identification of linguistic drivers of conversation quality in autistic girls vs. boys could lead to the development of personalized supports that improve conversational outcomes and enhance social success for all children.

Objectives: Identify drivers of conversation quality in seventy-three female and male youth with or without autism, using computational linguistics and cross-validated machine learning approaches.

Methods: Seventy-three participants who were verbally fluent (Table 1) engaged in a 5-minute “get-to-know-you” conversation with a young adult confederate. After the conversation, the adult confederate completed a modified version of the Conversation Rating Scale (CRS; Ratto et al., 2011). Statements such as, “the other person was interested in what I had to say” were rated on a scale of 1 to 7. Audio samples were systematically diarized, time-aligned, and orthographically transcribed. We extracted two different sets of features: dialogue (lexical) features based on experts’ knowledge and acoustic features used in previous studies (Cho et al., 2019). Cross-validated support vector regression (SVR) and multi-layer perceptron (MLP) predicted CRS scores with high accuracy, and the top predictive features for girls and boys were identified by interpretable machine learning methods.

Results: For autistic boys, features like average sentence length and percent of silence were top predictors of conversation quality (Figure 1). In contrast, acoustic features (e.g. loudness) accounted for more variance in CRS scores in girls. We also observed that our predictor performed better when predicting the interaction quality of girls than that of boys, regardless of the children's diagnostic status.

Conclusions: Natural conversations provide an ecologically valid opportunity to characterize speech-language markers of social communication challenges that manifest differently in autistic girls vs. boys. In this study, we found that CRS scores are driven by linguistic patterns that differ by sex. Specifically, acoustic features predicted conversation ratings for autistic girls, whereas dialogic features were more predictive for autistic boys. These findings can be used to inform personalized supports for enhancing conversational success in autistic youth and provide a first glimpse into potential drivers of conversation quality in boys vs. girls that could improve our long-term understanding of behavioral heterogeneity in autism. Ultimately, improved understanding of sex differences in autism will help to lower the age of diagnosis for girls and improve access to early intervention services for this understudied subgroup.
Background: Prediction deficit theories of autism spectrum disorders (ASD) propose that autism characteristics can be attributed to domain-general differences in prediction relative to neurotypical (NT) peers. According to these theories, autistic individuals assign disproportionate weight to prediction errors (i.e., mismatches between expected input and actual input), leading to higher perceived novelty and “hyperplasticity” of learning (overweighting current exposure while underweighting aggregated prior learning). As these prediction differences are posited to be domain-general, hyperplasticity of learning should be observable in language learning and processing for autistic individuals. However, no studies to date have examined this theoretical account in a linguistic context. Prediction differences could have cascading consequences for language development in ASD, warranting examination in young children in the early stages of language acquisition.

Objectives: The purpose of this study was to determine whether 2- to 3-year-old autistic children demonstrate prediction differences indicative of hyperplasticity during a linguistic sequence-learning task compared to NT peers matched on nonverbal cognition.

Methods: Participants included 33 autistic children (M=31.30 months, SD=3.36) and 33 NT children (M=20.04 months, SD=1.68) matched on nonverbal cognition (as measured by Developmental Assessment of Young Children (DAYC-2) raw scores). Participants in the ASD group were older to facilitate matching. Diagnoses were confirmed via psychologist administration of autism diagnostic measures. Children in both groups participated in an eye-tracking task designed to elicit anticipatory eye movements (AEMs) to target words based on their predictive relationship with a cue word. In block 1 of the experiment, “happy” consistently predicted “kitty” while “silly” consistently predicted “birdy” such that the cue-target probabilistic relationship increased over time. The contingency was then switched for two trials so “happy” preceded “birdy” while “silly” preceded “kitty”. In block 2, the contingencies reverted to the original pairings. If children make predictions based on cumulative probability, then AEMs to target images should be similar between block 1 and block 2. However, if autistic children overweight recent observations at the expense of cumulative probability (thus demonstrating hyperplasticity of learning), then AEMs to target images should be disrupted in block 2 compared to block 1. Proportion of looks to target during the anticipatory window (2200-2700 ms after trial onset) was the dependent variable regressed on the three-way interaction of diagnostic group, block, and linear time.

Results: Results revealed a significant group by block interaction, indicating that autistic children demonstrated a larger discrepancy in AEMs to target between block 1 and 2 than NT children (Figure 1). Linear time and the three-way interaction between group, block, and linear time were also significant, indicating that AEMs to target and group differences between blocks increased over the course of the trial.

Conclusions: Results of this study provide support for theories proposing prediction differences underlying autism characteristics. Findings suggest autistic toddlers’ predictions during language processing are more driven by recent exposures than aggregated experience, possibly contributing to early language difficulties. Ongoing work by our research group will examine whether early prediction differences demonstrated in this study are related to non-linguistic processing and to language abilities one year later.

Diagnostic, Behavioral & Intellectual Assessment

209 - Breaking Down Barriers to Research for Children with Genetic Disorders, Intellectual Disability, or Communication Challenges

Panel Chair: Carol Wilkinson, Department of Developmental Medicine, Boston Children's Hospital / Harvard Medical, Boston, MA

Discussant: Alycia Halladay, Autism Science Foundation, Scarsdale, NY

Collecting neuroimaging and behavioral data in children with genetic disorders associated with autism can be challenging for a variety of reasons. Increased frequency of intellectual disability, communication challenges, and behavioral dysregulation can limit the types of assessments used as well as the amount and quality of the data collected. Many standardized assessments of cognitive, language, and behavior do not capture meaningful functional differences across individuals who fall below normative averages. Further, travel to study sites can be challenging, both financially and logistically, and create additional barriers to participation. Innovative and effective methods in data collection to support research in these often underserved and understudied populations is crucial to improving our understanding of common challenges within these disorders and advancing effective therapeutics. Here we will discuss data collection practices covering the following themes: (1) collecting meaningful and accurate behavioral assessments, (2) methods for successful acquisition of lab-based EEG, (3) methods for successful in-home based EEG acquisition, and (4) using virtual visits for speech and language assessments. The panel will include cross disciplinary discussion and exchange of ideas on how to overcome challenges related to data acquisition in autistic children with intellectual, communication, behavioral, or logistical barriers to participation.

(Panel Discussion) Standardized Assessment of Individuals with Neurogenetic Syndromes: Challenges and Recommendations
Background: Many individuals with neurodevelopmental disorders, particularly those with an associated genetic diagnosis, have significant cognitive and language impairments. The variety and extent of impairments in these individuals impacts their ability to complete valid behavioral assessments. Duplication of 15q11.2-q13.1 (dup15q syndrome) is one of the most common copy number variations associated with autism spectrum disorders (ASD) and intellectual disability (ID). As with many neurogenetic syndromes, accurate behavioral assessment is challenging, frustrating efforts to clearly characterize the phenotype and lay the groundwork for upcoming clinical trials. The dup15q population represents a wide range of abilities, from near normal IQ to profound intellectual disability, presenting an excellent opportunity to examine the strengths and limitations of standardized measures.

Objectives: Using the dup15q population as an example, we will present guidelines for collecting assessment data in heterogeneous NGS populations and examine the utility of common standardized assessment.

Methods: Participants included 62 children with dup15q syndrome (30 months to 18 years). Participants were assessed at either a university 15q specialty clinic, or at a Dup15q Alliance Family Conference. The assessment battery included a variety of measures to assess cognition, language, adaptive behavior, motor skills, challenging behaviors and social communication characteristics (Table 1).

Results: A comprehensive evaluation of individuals with an NGS should evaluate cognitive and language functioning, adaptive behavior, motor skills, and co-morbid psychiatric concerns (e.g. autism, anxiety). Verbal and nonverbal cognitive were evaluated using a flexible set of assessments with “drop-down rules”, such that participants first attempted an age-appropriate standardized assessment, and then moved to an out-of-norm assessment if valid scores cannot be obtained. In our dup15q sample, cognitive and language development were assessed with either the DAS-II or the MSEL. The MSEL was used to assess participants who were under 68 months of age, and participants who were older but unable to achieve a basal score on the DAS-II. Ratio scores were used to account for the scores of children who performed outside of the standardized norms for their chronological age. This provided a wide range of cognitive and language scores, from the average to severely impaired range. Adaptive behavior standard scores, as assessed with the VABS, showed a normal distribution without evidence of a floor effect, suggesting that the VABS is an appropriate measure for evaluating the full range of participant abilities. Parent report of autism symptoms (SRS) was moderately correlated with verbal and nonverbal cognition ($r=-0.55$, $p<.001$; $r=-0.64$, $p<.001$), while ADOS-2 scores were associated with verbal cognition only ($r=-0.37$, $p=0.03$). Parent report of challenging behavior, as evaluated with the ABC, was largely unrelated to cognitive ability.

Conclusions:

Studies of individuals with neurogenetic syndrome should employ a flexible set of assessments, that allow each participant to receive the assessment that reflect his/her developmental abilities and provides a range of scores that facilitates stratification. Although measures of ASD symptoms (such as the ADOS and SRS) are likely relevant to clinical trials, they are strongly correlated with cognitive ability in children with NGS and should be interpreted with caution.

209.002 (Panel Discussion) Lab Based EEG Collection in Young Children with Fragile X Syndrome

C. L. Wilkinson, Department of Developmental Medicine, Boston Children's Hospital / Harvard Medical, Boston, MA

Background: Collecting high quality EEG data in young children requires successful netting and placement of EEG sensors, sustained attention to selected stimuli, and behavioral regulation. Autistic children with significant behavioral, communication, and cognitive challenges are often not included in neuroimaging research studies due to these barriers with data collection. This creates a large gap in our understanding of the neurobiology underpinning severe deficits in communication or cognition that greatly impact functioning for some individuals with autism. Here we present our experience in collecting data from young children (2-7 years old) with Fragile X syndrome (FXS). FXS is the most common inherited form of intellectual disability and virtually all males will have some autistic traits with 30-50% meeting formal diagnostic criteria. Individuals with FXS also often have sensory hypersensitivity, hyperactivity, and inattention making EEG data collection especially challenging.

Objectives: To discuss trials, tribulations, and triumphs in collecting EEG in children with Fragile X Syndrome.

Methods: EEG netting was attempted in a total of 16 children with full mutation FXS (15 male, 1 female). Prior to study visits an extensive interview was performed with parents to obtain information about each child’s language ability, preferred interests, motivators, and behavioral characteristics. Families were provided a social story reviewing the lab visit, including details of EEG netting. Once netted, four EEG paradigms were attempted (baseline, 2 passive auditory tasks, and visual evoked potential). Percentage of successful netting and task completion was assessed and a quality review of reasons why netting was unsuccessful was performed.
Results: 14/16 (87%) of FXS children were successfully netted and 10/16 (62%) completed portions of all four tasks. Visual tasks were more challenging that passive auditory tasks. Data quality analysis showed that compared to age-matched typically developing comparison groups, FXS participants had significantly lower number of trials completed during both visual and auditory tasks (p<0.05, p<0.005). Children unable to complete all four tasks were older in age (66m vs. 46m; p = 0.01), and had better language ability based on the Preschool Language Scale Total Raw score (79.6 v 49.9, p <0.01).

Conclusions: With preparation and supports in place EEG data can be successfully collected in children with behavior and communication challenges. Specific behavioral strategies and task designs will be shared as part of this presentation.

209.003 (Panel Discussion) Experiences from the Road: Mobile EEG Success for Minimally Verbal and Minimally Ambulatory Populations
C. M. Hudac. Department of Psychology; Carolina Autism and Neurodevelopment (CAN) Research Center, University of South Carolina, Columbia, SC

Background: Several subgroups of autism linked to known genetic variants are rapidly advancing towards personalized treatments (Freitag, Persico, & Vorstman, 2022). However, brain-based biomarker development in these subgroups is often lacking due to study enrollment criteria that excludes based upon verbal or cognitive abilities. For instance, many people with SCN2A (96%) or GRIN2B (~70%) mutations have a diagnosis of intellectual disability (ID), even in the absence of epilepsy (Carvill et al., 2021). Amongst other avenues to improve inclusion of minimally verbal and minimally ambulatory subgroups (e.g., paradigm modifications, behavioral training ahead), there is a current push towards mobile, off-site research testing provide an opportunity.

Objectives: Here, we describe the process for conducting a 3-month road trip for research in monogenic groups associated with ASD (SCN2A, GRIN2B) and report on the success of data collection in participants.

Methods: At the start of the road trip, 12 families of a child with an SCN2A or GRIN2B mutation had confirmed research testing date for the BioGENE Study. The EEG experimental battery consisted of a resting state task (6 minutes), a classic auditory oddball attention task (Hudac et al., 2018; 8 minutes), and a new speech-discrimination oddball attention task (8 minutes). Parents reported on demographics, autistic and social behaviors (SRS), behavioral features (CBCL), sensory features (Sensory Profile), and repetitive behaviors (RBS-R).

Results: The 92-day long solo road trip involved driving over 15,000 miles (over 24,000 km) across the United States. The trip was only partially structured so that additional families were able to enroll in the study flexibly. By the end, we completed testing with 55 participants aged 1-25 years (30 female, 25 male; 1 additional parent carrier). Forty-eight participants (87%) had an ID diagnosis. Thirty-six participants (65%) were nonverbal and an additional 4 participants only used a few verbal phrases. Sixteen participants (29%) were non-ambulatory or required assistance to walk. We will share specific planning features, behavioral strategies for the participants, and education strategies we used to aid the helpers that joined the research session (e.g., parents, siblings, ABA therapists).

Almost all participants 54/55 (98%) successfully provided data for at least 1 experimental EEG task; the one child without data did not want to wear the EEG net. Participants who were walking and talking did retain more ERP trials after data cleaning, F(1, 48)< 4.76, p < .034, but trial retention was not related to diagnostic status (ASD and/or ID), F(1, 48)> 1.68, p < .20.

Conclusions: This study “fuels” the momentum towards improving inclusivity of EEG biomarkers for subgroups of autism that are minimally verbal or minimally ambulatory, as well as improving access for rural families.

209.004 (Panel Discussion) Remote Assessment of Speech/Language and Motor Skills in Children with Neurodevelopmental Conditions
K. V. Chenausky1, S. V. Gill1, L. Keegan1 and M. Ayoub2, (1)Communication Sciences and Disorders, MGH Institute of Health Professions / Harvard Medical School, Boston, MA, (2)Boston University, Boston, MA

Background:
Communication and motor delays are common across neurodevelopmental conditions (NDCs) – for example, spoken language is delayed or even absent in up to 78% of NDCs. Assessment of spoken language and motor skill is challenging in this population for many reasons: families are geographically remote, children may be dysregulated in unfamiliar locations, and many standardized instruments do not accurately characterize their skills. Yet careful, accurate characterization of spoken language and motor skills is vitally important not just for treatment planning, but also for monitoring progress, capturing phenotypic variations, and understanding phenotypic similarities across conditions.

Objectives: We report data capture rates and descriptive statistics for a remote assessment protocol to capture spoken language and motor performance in moderately and profoundly affected children with one particular NDC, autism spectrum disorder (ASD).
Results:

Mean Vineland Adaptive Behavior Composite for the group was 58.2 (SD 13.8), range 13-84. Mean Vineland Receptive Language V-score was 6.8 (SD 4.2); that for Expressive Language was 3.9 (SD 4.4). On average, children produced 38.6 different words during the language sample (SD 49.8, range 0-233). Using a cutoff of 20 Number of Different Words (NDW) from the language sample, 48 participants were classified as minimally verbal. 42 participants were able to produce at least three repetitions of most of the syllables in the syllable repetition task. Speech repetition data was sufficient to determine that 52 participants met criteria for childhood apraxia of speech, while 17 did not meet criteria and 21 did not produce sufficient speech to classify. Acoustic analysis of syllables was possible for 38 participants, and kinematic analysis for 19.

Of the 85 participants with available motor data, 57 displayed 70% or more “successful” walking trials (i.e., produced either quantitative or behavioral data). Although only 27 participants were able to attempt heel-to-toe walking, 74 were able to balance on one foot (either independently or with extra support). Only 19 participants had majority “unsuccessful” trials (i.e., expressed behaviors coded as “other”) across all tasks, typically due to factors such as fatigue, lack of motivation, or environmental noise. 5 participants could not be processed due to poor video quality.

Conclusions: Remote assessment of spoken language and motor skills is feasible for children with NDCs and yields rich phenotypic data.

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**PANEL DISCUSSION — DIAGNOSTIC, BEHAVIORAL & INTELLECTUAL ASSESSMENT**

**227 - Divergent Trajectories Associated with Genetic Liability for ASD and Other Neurodevelopmental Disorders**

**Panel Chair:** Catherine Burrows, Department of Pediatrics, University of Minnesota, Minneapolis, MN

**Discussant:** Lonnie Zwaigenbaum, Autism Research Centre, University of Alberta, Edmonton, AB, Canada

Children at varying genetic liability for ASD provide unique opportunity to study the progression of ASD-relevant features across development. These study designs enable examination of trait and symptom emergence prior to the consolidation of the disorder in unbiased, prospectively ascertained samples. Diverse risk samples may also share early precursors that complicate clinical decision-making and lead to both diverging and shared pathways of liability over time. We present 4 talks studying children at increased likelihood for ASD and other neurodevelopmental conditions based on familial likelihood (i.e., having an older sibling with ASD or ADHD) or genetic liability (i.e., Fragile-X), studied longitudinally. We examine a variety of predictors (biological sex, Burrows; later group membership; Piergies) and outcomes, including ASD diagnostic outcomes (Grzadzinski, Caravella), and attention shifting (Piergies). Results highlight shared genetic predisposition for a variety of concerns over time, including attention shifting difficulties and psychopathology (e.g., anxiety and attentional concerns) in later childhood. Patterns of symptom emergence appear to be time-varying and differing by sex. These findings highlight the importance of continued longitudinal investigation of children at likelihood of developing ASD and other neurodevelopmental concerns.

**227.001 (Panel Discussion) ASD Diagnostic (In)Stability in a High-Familial Likelihood Sample from 24 Months to School-Age: Qualitative and Quantitative Impressions from Case Reviews**

Background: Autism spectrum disorder (ASD) is historically considered to be a lifelong, pervasive neurodevelopmental disorder. However, recent works highlight a subset of individuals who go on to have “optimal outcomes” or no longer meet criteria for ASD later in life. Trajectories of late onset (after 24-36 months) are less frequently reported in research, even though the average age of diagnosis in the community is over 48 months. Studies that follow siblings at elevated likelihood for ASD longitudinally from early life provide a novel opportunity to evaluate diagnostic trajectories in a genetically enriched sample.

Objectives: To establish quantitative and qualitative descriptions of behavioral profiles in individuals with variable ASD diagnoses from 24 months of age to school-age, with the goal of guiding clinical care in diagnostic practices.

Methods: A group of clinical researchers with expertise in ASD conducted extensive review of current and historical information in cases with changing diagnoses seen through the Infant Brain Imaging Study (IBIS). The workgroup met virtually for at least 1 hour per case to review clinical information obtained at 6/12 months (pre-diagnosis), 24-37+ months (initial diagnoses), and 7-11 years (school-age diagnoses).

Results: A total of 31 cases shifted diagnoses from toddlerhood to school-age; 18 cases (58%) had diagnoses of ASD in early life but transitioned to non-ASD by school-age (ASD→non-ASD) while the remaining 13 (42%) received a first diagnosis of ASD at school-age (non-ASD→ASD). See Table 1 for further characterization. Six ASD/non-ASD cases (33%) were female while 7 (54%) non-ASD→ASD cases were female. At 24 months, clinicians were “very confident” (on a 3-point scale from “not confident” to “very confident”) in their diagnostic accuracy for 5 (28%) ASD→non-ASD cases and 6 (46%) non-ASD→ASD cases. Many children in the ASD→non-ASD group showed persistent but subthreshold ASD symptoms at school age. Most children in the non-ASD→ASD group showed few symptoms at 24 months (apart from 38% demonstrating language delays), but significant symptoms at school age. At school-age both groups showed mild elevations on the Child Behavior Checklist (CBCL) on Attention Problems, ADHD problems, and Depressive Problems. Following in-depth case review, “late onset of symptoms” was a predominant clinician descriptor of the non-ASD→ASD (80%). For all cases, reviewing clinicians agreed with diagnoses (ASD or non-ASD) at each time point, highlighting the accuracy with diagnoses given based on available information.

Conclusions: Overall, a “deep dive” into clinical cases with changing diagnostic trajectories from toddlerhood to school-age revealed findings with immediate clinical implications. Groups differed in terms of symptom trajectories, with many ASD→non-ASD children demonstrating persistent symptoms at school age, while the non-ASD→ASD group showed symptom onset after the 24-month visit. Children in both groups demonstrated consistent patterns (per clinician review and CBCL) of non-ASD psychopathology at school-age, mostly anxiety and ADHD, possibly highlighting the shared genetic predisposition across psychiatric conditions as well as overlapping early phenotypes. A useful descriptor for longitudinal studies to consider may be “ever” ASD (did the individual ever meet criteria for ASD?), which clinical researchers agreed was an accurate conceptualization of all the cases reviewed.

227.002 (Panel Discussion) Longitudinal Stability of Autism Spectrum Disorder Diagnoses in 2–7-Year-Old Males with Fragile X Syndrome
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Background: Fragile X syndrome (FXS) has the highest penetrance of ASD of any single gene disorder. Concerns exist within the field about the ability to accurately diagnose ASD in FXS males in toddlerhood when global developmental delays are present, and diagnostic accuracy may be reduced. To date, no study has utilized a clinical best estimate (CBE) diagnostic procedure to examine the stability of autism diagnoses in young males with FXS, and how symptom trajectories differ between individuals with stable and unstable diagnoses.

Objectives: The present study has two aims; first, to report the stability of clinical best estimate diagnoses of ASD in 2-7-year-old males with FXS. Second, to compare trajectories of autism symptomatology across diagnostic stability groups to examine change over time.

Methods: Thirty-one males with FXS were evaluated longitudinally between 2-7 years old (range: 2-4 assessments each, 101 total). CBEs were determined at each visit. A stable diagnosis was defined as meeting or not meeting CBE criteria for ASD at all time points: Stable-ASD or Stable-noASD. A non-stable diagnosis was defined as changing between an ASD and non-ASD diagnoses; Unstable-noASD (i.e., ASD to No ASD) and Unstable-ASD (i.e., non-ASD to ASD). To examine symptom trajectories, video clips from each assessment were used to code the Brief Observation of Social Communication Change (BOSCC). Mixed-effects models were used to examine trajectories of BOSCC scores (Social and RRB) across the four stability groups.

Results: Across participants, 54% (n=17) fell in the Stable-ASD group, 22.5% (n=7) fell in the Stable-NoASD group, 9% (n=3) fell in the Unstable-NoASD group, and 13% (n=4) fell in the Unstable-ASD group (Figure 1). Thus, 77% demonstrated a stable diagnostic trajectory, and 23% demonstrated an unstable diagnostic trajectory.
Visual Attention Shifting in Infants Developing Autism and ADHD Concerns

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**Background:** Autism and ADHD have distinct diagnostic criteria yet frequently co-occur (Lai et al., 2019) with some symptom overlap (Ronald et al., 2014). Evidence of shared heritability in families (Miller et al., 2019) suggests potential for common developmental pathways and early markers, including differences in attention regulation (Hatch et al., in prep; Miller et al., 2020). Substantial evidence supports differences in visual attention shifting among infants with family histories of autism (Elshabagh et al., 2013), but this has not been examined in infants with family histories of ADHD.

**Objectives:** We aim to compare visual attention shifting among infants developing autism and ADHD concerns.

**Methods:** Data were drawn from a prospective longitudinal study of infants with family histories of autism (n=39) or ADHD (n=31), or no history (n=24). At 12 and 18 months, visual attention shifting was measured using a gap-overlap task, requiring attention to be redirected from a central to peripheral stimulus under two conditions: gap (central stimulus disappears before peripheral stimulus appears) and overlap (central stimulus remains visible). A gap effect was calculated by subtracting average gap from overlap latencies to fixate on the peripheral stimulus. Preliminary ANOVAs and post-hoc comparisons examined differences in latencies across trial types and whether there were gap effects at each age by 24- or, when possible, 36-month outcome group: Autism (meeting DSM-5 criteria), ADHD Concerns (elevated symptoms), and Comparison. Associations between latencies and concurrent measures of autism-relevant and ADHD-relevant behaviors were also examined.

**Results:** Results are summarized in Figure/Table 1. There were no group differences at 12 months. At 18 months, there was a main effect of group for overlap latencies. Relative to the Comparison group, the Autism group exhibited significantly longer latencies (p=0.027; Cohen’s d=0.62); the ADHD Concerns group exhibited marginally longer latencies (p=0.069, Cohen’s d=0.47). There was also a main effect of group for the gap effect at 18 months. The Autism group exhibited a marginally larger gap effect (p=0.080, Cohen’s d=0.47) than the Comparison group; the ADHD Concerns group exhibited a significantly larger gap effect (p=0.042, Cohen’s d=0.54).

Controlling for group, associations with examiner-rated social engagement were non-significant (12-month ps>0.185, 18-month ps>0.226). However, the association between examiner-rated attention, activity, and impulsivity composite and the gap effect was significant at 12 months (r=0.28, p=0.037). Associations between ADHD-related behaviors and gap (r=0.39, p=0.001) and overlap (r=0.30, p=0.01) latencies were significant at 18 months.

**Conclusions:** Results suggest overlapping difficulties in visual attention shifting at 18, but not 12, months among infants developing autism or ADHD concerns, replicating findings that infants later diagnosed with autism exhibit longer overlap latencies (Kawakubo et al., 2007) and larger gap effects than comparison infants during the second year (Elshabagh et al., 2013). No prior studies have examined this in early ADHD. Studies involving older children with ADHD have found no differences or longer latencies and smaller gap effects (Matsuo et al., 2015; Kleberg et al., 2020). Early-life attention shifting may relate to ADHD-relevant, but not autism-relevant, behaviors. Findings may have implications for understanding neuropsychological mechanisms and developing interventions.
Background: The study of ASD in females has been confounded by male-biased diagnostic inclusion criteria. Since the classic paper by Wing and Gould (1979), describing females with ASD as being “active-but-odd”, seeking interaction in ways that distinguished them from Kanner’s descriptions of social isolation, there has been a recognition of sex-specific differences in ASD-related impairment. However, virtually all studies aiming to characterize females were conducted with subjects ascertained on the basis of having first met clinical (DSM) criteria and are biased towards males. Studies utilizing prospective recruitment of children at increased likelihood of developing ASD and repeated assessments of ASD symptomatology provide a unique avenue to explore sex differences in the timing of onset of symptoms.

Objectives: 1) Examine rates of “late diagnosed ASD” (i.e., first ASD diagnosis in school age despite early ASD diagnostic evaluations) by sex in a high-familial likelihood (HL) for ASD sample. 2) Characterize differences in early development between early-diagnosed and late-diagnosed ASD in an HL sample.

Methods: Participants enrolled in the Infant Brain Imaging Study (IBIS) who received an ASD diagnosis (N=115; 31 females) based on clinical best estimate at any visit were classified as “early diagnosed” (Early-ASD; first diagnosed at the 24+ or 36-month time point; N=101) or “late diagnosed” (Late-ASD; first diagnosed at school age; 7-11 years; N=14). We present sex differences in group composition. We then examined differences in early language skills (24-month Mullen Expressive Language T-Score) between Early-ASD and Late-ASD groups using univariate ANOVA.

Results: Early-ASD participants were more likely to be male (77% or 78 males of 101 Early-ASD participants), whereas Late-ASD participants were more likely to be female (57% or 8 females of 14 Early-ASD participants; chi-square=7.38, p=0.007). 26% of females (8 of 31) versus 7% of males (6 of 84) were not diagnosed until school-age. Early-ASD participants demonstrated lower Mullen Expressive Language skills (M=39.60, SD=1.44) compared to Late-ASD participants (M=48.98, SD=3.26), F(1,108)=6.93, p=0.01. The main effect of sex and sex by group interaction was not statistically significant. However, when examining proportions of children demonstrating average or higher 24-month expressive language skills, 88% of Late-ASD females (7 of 8) had average or better skills, compared to 17% of males (1 of 6). Overall, 23% (7 of 31) of ASD-ever females versus 1% (1 of 84) of ASD-ever males were diagnosed late and had average or better language, revealing a striking contrast of high clinical relevance.

Conclusions: These findings are the first from a prospective sample unbiased by ASD diagnostic inclusion criteria and who have received identical assessments, that demonstrate that females are diagnosed later than males. This difference is at least partially explained by better language skills in late diagnosed females. Findings are consistent with reports in community ASD samples showing both pragmatic/linguistic deficits and advantages, specific to ASD females, elicited in semi-structured interactions. These findings provide support for the need to fully explicate the longitudinal features of the ASD phenotype in females and highlight the utility of samples that are not biased with respect to ascertainment strategy.
Objectives:

The objective was to pilot the content and validate the digital ICF core set rating scales for ASD. Particularly, we sought to examine whether self-reported autistic functioning profiles in terms of the ICF domains of body functions, activities and participation, and environmental factors would mimic current research evidence on strengths and challenges of autistic people, and environmental barriers and facilitators they encounter.

Methods:

The digital ICF core set rating scales for ASD were piloted in a group of 48 adolescents and adults (17-65 y, M=38.9, SD=12.3; 35 female) diagnosed with ASD and 203 (17-82 y, M=43.4, SD=15.2; 110 female) general population controls. ICF profiles per group (ASD vs. controls) were analyzed and compared per ICF domain and items.

Results:

Autistic participants reported strengths for several body functions (e.g., creativity, curiousness, sensory accuracy, logical thinking) and in the activities/participation domain (e.g., processing of symbols, avoiding health and economic risks), although these were not statistically superior to the control participants. They also reported a range of challenges, such as poor sleep, rumination, low control over activity levels and unusual motor movements, and distractibility, problems with change in routines, handling tasks and stress, and a range of social behaviors and relations as well as community exclusion. All of these were significantly more challenging than in controls. Perceived reported environmental facilitators were some forms of medication (melatonin), cognitive aids and communication and media services. Perceived barriers were other medications (e.g., neuroleptics), lack of support from authorities, insurances, clinical, employment and forensic services, as well as the education system. Most of the environmental barriers were perceived as significantly more hindering by autistic people than by control participants.

Conclusions:

Results indicate that the digital ICF core sets rating scales generate valid information on functioning profiles in ASD regarding both individual strengths and challenges and environmental facilitators and barriers. These results give a balanced and holistic picture of functioning in ASD beyond clinical diagnosis and serve support planning, environmental adaptations to needs, and strengths-based approaches. Larger scale data collections on the ICF core sets platform and formal comprehensive psychometric evaluation including young and school-aged children are required to make more firm conclusions about its usefulness and scientific properties - the studies are currently in progress.

303.002 (Oral) Development of a Tool to Facilitate Community-Based Identification and Engagement with Care of Children with Developmental Disabilities in Ethiopia and Kenya


Background:

Most children with autism and other developmental disabilities (DD) in sub-Saharan Africa remain unidentified and undiagnosed due to a lack of awareness and scarcity of qualified human resources. A community informant method is a task-sharing approach whereby trusted community members with the necessary training undertake household visits to improve identification and encourage care engagement.

Objectives:

To co-develop a community case detection tool (CCDT) and associated training package aiming to increase community-based detection of children with DD and promote care engagement in Ethiopia and Kenya.
Methods:

The study took place across four sites: Addis Ababa and rural Gurage zone in Ethiopia, and Nairobi and rural Kilifi in Kenya.

Eight consultation workshops (two in each site) were conducted to understand the needs and priorities of the local community. Stakeholder groups included caregivers of children with DD, community health workers, teachers, policymakers, and professionals from the health and education sectors. Participants were asked to reflect on current community understanding of DD and which cadre of community members can support identification of children with DD. Stakeholders were presented with sample tools using vignettes and illustrations describing signs of DD and a developmental milestone chart. They were also consulted on the training needs of prospective community informants and the need for awareness-raising in the wider community. All workshops were audio-recorded, transcribed verbatim and data analyzed using thematic approach. These findings informed the development of a draft CCDT and associated training package.

Results:

Stakeholders shared there is a high level of stigma and low awareness about DDs in the community. It was reported that among community members, DDs were often attributed to supernatural causes, spirit possession and wrongdoing by parents, resulting in stigma and discrimination against children with DDs and their caregivers.

When reviewing the sample tools, participants proposed using a combination tool with vignettes, illustrative images, and referral guidance. Participants suggested that vignettes should include positive characteristics to avoid reinforcing negative beliefs and should instil hope to promote help-seeking. The resulting draft tool includes two vignettes describing children with intellectual disabilities including autism, supplemented by illustrations. The tool includes a simple decision tree to encourage referrals for professional assessments and supportive care.

Community health volunteers and teachers were identified as suitable community informants in both countries, in addition to women’s development groups in Ethiopia. Parents of children with DDs were also suggested due to their shared lived experiences.

Alongside the community case detection, awareness-raising for the larger community was suggested to promote community engagement and address negative beliefs. The involvement of parents of children with DD in raising awareness was encouraged, in line with the principles of social contact to address stigma towards children with DD and their families in the community.

Conclusions: The acceptability and feasibility of the draft case detection tool will be tested in a pilot study followed by a large-scale evaluation across all four project sites. The findings of this project can inform initiatives to facilitate early detection and care engagement across low-income contexts.


Background: SPARK is an online research study that collects phenotypic and genetic data on individuals with autism and their families. The online research environment creates a unique ability to engage hundreds of thousands of participants; however, this scale does not allow for traditional clinical examinations and requires mostly self-and parent-report surveys. Due to differences in diagnostic practices and differences in parent recall, it can be challenging to assess accurate informant-report of diagnostic history, assessment results, and reporting of individuals with intellectual disability.

Objectives: Leveraging the data collected in SPARK, the objective of the current study was to create an algorithm for estimating cognitive impairment in children and dependent adults in the absence of clinical IQ scores and evaluate its accuracy.

Methods: The algorithm of the derived cognitive impairment variable (DCI) assesses 14 parent-reported variables and assigns a dichotomous value of likely cognitive impairment (0/1). The variables seeding the DCI include reported intellectual disability diagnosis, language level, cognitive delay relative to age, mental age equivalent, language disorder diagnosis, language regression, minimally verbal status, Vineland-3 Communication standard score, and parent reported cognitive test scores. It is calculated for children over the age of 2 years and dependent adults with a reported professional diagnosis of ASD. DCI results were compared against nonverbal (NVIQ) and full scale (FSIQ) IQ scores from medical record review, where NVIQ or FSIQ < 80 was defined as cognitive impairment (inclusive of borderline intellectual impairment). Accuracy of the DCI classification was evaluated using the Receiver Operating Characteristic (ROC) curve and associated statistics completed in SPSS.

Results: 3,845 individuals were included (mean age 8.3 years; 21% female). This sample is representative in race/ethnicity and sex at birth of the full SPARK cohort of children and dependent adults. The full SPARK cohort of children and dependent adults is older than the
sample in this study (mean age 9.1 years). The area under the receiver operating characteristic curve (AUC) was 0.812. The sensitivity of the DCI was 80% and the specificity was 72%. The positive predictive value was 0.72 and the negative predictive value was 0.78.

Conclusions: The DCI has good accuracy in comparison to actual IQ based on the AUC. Selecting a cutoff of FSIQ/NVIQ<80 was shown to have the best performance for this set of variables in SPARK. The higher sensitivity and relatively lower specificity of the DCI are desirable for the intended application of this algorithm, which is to maximize the ability for researchers, particularly those in genetics, to identify individuals with subaverage intellectual ability when clinical IQ scores are not available. With this derivation, we were able to provide an estimate of cognitive status in over 99,000 individuals in SPARK with missing data. The algorithm serves as a model of a useful proxy for ID diagnosis in large scale studies. Future analyses should assess which variables in combination best predict actual IQ and extend the algorithm to an adult sample.

303.004 (Oral) Echo Autism in East Africa: Understanding Barriers to Care, Professional Development Needs to Improve Access to Autism Best-Practices
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Background: Limited access to health and education professionals with autism expertise in Kenya and across Africa creates significant disparities. Consistent screening, identification, diagnosis, and longitudinal care for autistic children is severely lacking leading to less optimal supports and services for children and their families. The Project Extension for Community Healthcare Outcomes (ECHO) framework represents an innovative solution for building capacity for best-practice healthcare for autistic people. ECHO Autism is a technology-enabled collaborative learning model developed to train community-based clinicians through mentoring, case-based learning, and guided practice. The model demonstrates effectiveness in increasing clinician self-efficacy related to autism in North America (Mazurek et al, 2017, Mazurek et al, 2020)

Objectives:
- Test the ECHO Autism model in Kenya to determine feasibility and acceptability.
- Assess participant changes in self-efficacy related to autism following participation in ECHO Autism.
- To increase collaboration across disciplines, primarily doctors and therapists, teachers, and direct providers.

Methods: A hub of content experts including developmental behavioral pediatrician, mental health clinician, resource specialist, and parent of a child with autism conducted twelve, 90-minute ECHO Autism sessions over six months. Content experts were predominantly from Kenya with one based in the US. The original ECHO Autism curriculum was modified for cultural and linguistic considerations specific to Kenya and similar African locations. Pre- and post-surveys were administered to participants evaluating barriers to care, self-efficacy related core topics in autism, participant demographics, and practice patterns.

Results:
Forty-two unique professionals participated from seven African countries, as well as the United States and Australia. Forty-five percent of participants identified as school professionals and 55% of participants identified as healthcare professionals. Average session attendance was 19.

Participants reported positive impacts on their ability to care for children with autism. Specifically, 99% of individuals agreed or strongly agreed with the statement “participation will improve my ability to care for children with autism in my practice.” 98% felt the “recommendation of the specialists will improve my ability to provide care for children with autism in my practice.”

Ninety-six percent reported learning new information about autism best-practices, and 95% agreed or strongly agreed that they connected with peers and would ask for professional advice and recommendations.

As a result of participating in ECHO Autism in Kenya 100% of participants had access to screening tools and the ability to utilize those tools for any child, as well as resources to share with families. This was a marked change from pre-program rates of 34%, 0% and 38% respectively. Participants reported high program satisfaction and interest in continuing learning through ECHO Autism.

Conclusions: The ECHO Autism program in Kenya is a feasible, acceptable, and satisfactory approach to increasing access to professionals with improved self-efficacy related to autism best-practices. The ECHO Autism program in Kenya demonstrates the adaptability of the model to reduce disparities across cultures and professional disciplines. The unique blend of participants from education and healthcare offers additional advantages for low- and middle-income countries where preventative healthcare may be less common, therefore necessitating multivariate approaches to autism screening, identification, diagnosis, and longitudinal supports.
**321.001** (Oral) Essential Characteristics of Autism: How Can We Provide Greater Access to High-Quality Assessments for Autism Spectrum Disorder?

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**Background:**

Due to increasing numbers of referrals seeking an assessment for ASD there are extremely long waiting lists for diagnostic evaluations, delaying early detection and intervention for ASD. Practitioners are thus under increasing pressure to provide quicker or abbreviated evaluations to decide whether a person needs a full diagnostic assessment for ASD or rather other examinations.

**Objectives:**

By carving out a subset of items from the ADOS-2 and ADI-R which optimally discriminated between ASD and other developmental or mental disorders, we laid the foundation for the development of a training tool designed to support health care professionals in referring (or not) a given person to a specialized center for ASD. Our tool is a web-based training program for practitioners not specialized in ASD that teaches a reduced but essential set of behavioral aspects characteristic of ASD by employing different didactic methods, e.g. video clips, case examples and quizzes.

**Methods:**

We used data from a well-characterized clinical population (n= 3,648 individuals, 1,884 with ASD, 1,764 with other developmental or mental disorders, initially referred with suspicion of ASD). This cohort contains individuals with a wide age and IQ range (age: 1 - 72 years, mean=13.3 ±11.1; IQ: IQ < 85 to > 115), 18% females. We used approaches such as machine learning or multivariate pattern classification in order to identify symptom profiles and predict individual diagnostic classification based on multiple clinical data. Random Forest Analyses were used to identify diagnostically relevant characteristics from ADOS and ADI-R that differentiate ASD from other mental disorders with gender effects as co-variates.

**Results:**

A reduced subset of diagnostic items from both ADOS-2 and ADI-R was identified that provided the best discrimination between ASD and other conditions across all age groups. For nonverbal children, for example, the subset included GAZE; SSOV; IJA, EYE; REQ EXPO. These models had the same or even better diagnostic accuracy than models with more items. On the basis of the identified behavioral aspects we devised an online-based training-tool to assist clinicians in focusing on the most relevant behavioral characteristics of a certain individual.

**Conclusions:**

Our first data emphasize two important aspects: First, a reduced number of diagnostic items sufficiently differentiates between ASD other conditions; second, practitioners may significantly expand their knowledge on ASD and its characteristic behavioral aspects via a 60 min training tool. Further results will show whether we will be able to significantly improve clinicians' competence to the point where they make fewer false positive or false negative assignments.

**321.002** (Oral) Early Autism Risk Detection from Electronic Health Records: Machine Learning and Early Developmental Milestones
Background: Early autism spectrum disorder (ASD) detection is critical for maximizing the benefits of early intervention. However, community providers are limited in healthcare resources for screening and lack ASD-specific expertise. Previous research shows the value of Machine Learning (ML) methods for subtyping ASD based on a child’s electronic health records (EHR) and for predicting ASD risk from a family’s medical history. ML offers an opportunity to utilize population-based routine surveillance records for predicting an infant’s ASD risk level.

Objectives: (1) Build an ML model to predict ASD diagnosis from an infant’s EHR generated by a national screening program, and test its accuracy. (2) Characterize the early developmental profile associated with ASD.

Methods: Database included EHR of 775,940 children born between 2014-2019, of which 1,163 had a documented ASD diagnosis after age 2 years. EHR consisted of data from routine screening visits: birth parameters, growth measurements, developmental milestone progression, and post-natal variables. 38 developmental milestones entered the model as binary variables. Model was limited to measurements from the first 2 years. Gradient boosting (CatBoost) ML model with a 3-fold cross validation and Yuden Threshold was applied. SHAP tool quantified feature importance.

Results: 93 features entered the initial model, an iterative process led to a final set of 14 consistently important features (fig 1). Model AUC=0.86. Using the model’s prediction we were able to detect a high risk group with a 0.76 incidence rate, a 760 fold increase of the incidence from the entire cohort (0.001). About 43% of the important features, related to developmental milestones. ASD was mostly associated with a higher rate of failing/passing verbal and non-verbal communication milestones checked in the second year of life, however also with higher rates of failing two fine motor milestones (fig 2). ASD was significantly (p<.001) associated with: higher rates of male, parental concern for development and not nursing, older mother age, lower pregnancy week, higher last weight by height percentile, and higher head circumference percentile standard deviation. Chi-square test with Bonferroni adjustment showed that 11.2% of the false positive group had a provider global developmental concern which was similar to the false negative group (11.1%) and significantly lower than the true positive group (27.6%, p<.001).

Conclusions: Findings highlight the utilization of ML methods for advancing personalized ASD screening under the age of 2 years considering interactions between birth, growth, post-natal, and developmental parameters. Future clinical testing of decision support models, can lead to tailoring providers' developmental checkup to detect ASD risk during routine care in the second year of life.

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Background: Research suggests that many children later diagnosed with ASD show early developmental deceleration – or slowing of developmental progress – and that this pattern is sometimes evident before clear autism symptoms emerge. Research from our lab has demonstrated that developmental deceleration can also be detected in a low-risk, general population sample using the Survey of Well-being of Young Children, a broadband screening tool recommended by the American Academy of Pediatrics to screen for developmental delays. While we found that a pattern of generalized developmental deceleration indicated a significantly elevated risk for ASD, it is not yet clear whether this pattern is present across all developmental domains or driven by any specific domain(s). 

Objectives: Determine whether early developmental deceleration is (1) observed in specific domains and (2) associated with elevated likelihood of ASD.

Methods: Children from ten Children’s Hospital of Philadelphia (CHOP) primary care sites were administered the Ages and Stages Questionnaire–Third Edition (ASQ-3) at 9, 18, 24, and 30-month well-child visits, according to AAP guidelines. Children with at least one ASQ-3 who received care at CHOP through at least 4 years of age were included (N=8,124). This cohort was racially (68.1% minoritized populations) and social-economically (50.4% public insurance/Medicaid) diverse, and received an average of 1.5 of the 3 recommended developmental screenings. ASD prevalence was 3.1%.

Results: Growth mixture models (GMM) identified distinct developmental trajectories of ASQ-3 scores from 9-30 months, with separate models run for each of the five ASQ-3 domains. GMMs identified four Fine Motor classes, five Communication and Problem-Solving classes, and six Gross Motor and Social classes.

Final models for Communication, Social and Problem-Solving domains each identified one or two classes characterized by decreasing ASQ-3 scores from 9-30 months, which were associated with increased risk for ASD. For example, children with typical and borderline
Communication skills at 9 months and a significant decrease from 9-30 months had an 11.4% and 25.0% risk of ASD respectively (compared to 3.1% rate in the entire cohort). Models also revealed that children with low scores at 9 months that were stable over time also had an elevated ASD risk (Gross Motor: 16.8%, 16.9%, Fine Motor: 19.4%, Social: 34.1%, Problem-Solving: 25.4%).

Conclusions: Children with developmental deceleration in social, communication, and problem-solving skills appear to be at elevated risk for ASD, suggesting that screening for trajectories in these domains may detect more at-risk children than screening at a single timepoint. In addition, deficits in any domain (including fine and gross motor) that emerge early and persist may also indicate ASD risk. Findings from the Social domain were of particular interest, as 34.1% of infants with clear deficits at 9 months were later diagnosed with ASD. While these developmental patterns were not sensitive enough to detect all children on the spectrum, the positive predictive values of developmental deceleration and early, persistent deficits were at or above those of autism-specific screening tools (Guthrie et al., 2019). Thus, repeated screenings with broadband developmental tools may be a fruitful avenue for earlier and more sensitive ASD detection.

Objectives: To develop and assess a framework for generating a culturally-sensitive parental-report autism screening measure that is highly predictive of autism risk.

Methods: We developed and piloted a pictorial screening tool to identify toddlers at risk for social communication challenges or autism. Eleven social communication behaviors associated with autism (e.g., reciprocal play, use of facial expression, imitation) were presented along with photos and brief text illustrating each behavior (See Figure 1 for example). Respondents identified the frequency of each behavior. We then employed Plan-Do-Study-Act (PDSA) cycles to solicit feedback from our target communities and allow us to adjust the behaviors, photographs, and item wording as needed. PDSA employs an iterative process that focuses on the translation of ideas into appropriate action by repeatedly soliciting feedback from end-users throughout development. During each PDSA cycle, we conducted focus groups with CALD caregivers of children aged 16-35 months in collaboration with nonprofit community agencies serving African and Middle Eastern immigrants and refugees and Black Americans. Additionally, caregivers completed a pilot version of the items and a Likert-scale survey assessing the usability and acceptability of the items. Nonprofit providers (i.e., program staff that work directly with target communities) also completed a survey about the items. A second PDSA cycle will occur between November – December 2022.

Results: Eighty-two caregivers completed surveys and participated in one of eight focus groups in a first PDSA cycle; five providers completed surveys (See Table 1 for caregiver characteristics). Mixed-methods analyses revealed that aspects of six of the 11 social communication behaviors required adjustment. Thematic analysis on the focus group transcripts resulted in four themes: increase the diversity of photo representation, improve the representation of “play behavior,” increase forms of imitation presented, and clarify the language of question items (e.g., “point to share interest” and “point to request” were both interpreted as requests).

Conclusions: Using mixed methods within PDSA cycles to systematically assess the cultural sensitivity of screening items from multiple end-users (i.e., providers and caregivers) results in rich feedback that informs essential revisions to the development of screening items. This process may provide a model for the development of culturally sensitive measures.

421.062 (Poster) $283M of Publicly-Funded Research Directed between 2008 and 2018 to Improve the Screening and Diagnosis of ASD in the United States: From Ideas to Instruments to Implementation

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Background: Researchers have sought to improve the identification of ASD through basic research (for example, on possible biomarkers) and applied research (for example, on the development of specific clinical tools for screening and diagnosis). We have previously noted patterns of publication and funding that generally favor basic research over applied research, with a negligible proportion targeting implementation involving community-based settings and professionals. Revisions to the Interagency Autism Coordinating Committee’s (IACC) strategic plan in 2016 included new objectives prioritizing applied research, perhaps to address the advocacy community’s desire for research demonstrating a more immediate impact on outcomes.

Objectives: What proportion of publicly funded research has sought to improve screening and identification of ASD in community settings since revisions to the IACC’s strategic plan in 2016? Has this increased over time relative to other areas of research?

Methods: We downloaded data from the Autism Research Database on all grants funded between 2008 and 2018 to address Identification, excluding projects that were privately-funded or that focused on training or infrastructure. We conducted a project-by-project review on the remaining projects to distinguish between those involving basic versus applied research, and within the latter between clinical, implementation, and other applied research.

Results: Between 2008 and 2018, $283M was directed towards 242 basic and applied research projects focused on improving Identification. Funding of applied research increased between 2008 and 2018 (see Figure 1), clearly overtaking basic research by 2017. While funding for applied research on screening and diagnosis remained flat (about $12M/year) between 2015 and 2018, funding for research on the general biology of ASD increased by over 50%, from $94M to $143M.

Most applied research funded between 2008 and 2011 involved clinical research (e.g., testing new tools for screening and diagnosis), but this shifted later (see Figure 2): of the 24 research projects funded between 2015 and 2018, only 6 involved clinical research while 7 involved implementation research and 11 involved other applied research (e.g., secondary data analyses to document related outcomes). An explosion was noted in the funding of implementation research in 2014, suggesting that the 2016 Strategic Plan did not spark changes but certainly reinforced the trend. Such research tested protocols for community-based screening and diagnosis, explored how family navigators can prevent families from being left behind, and tracked how early screening led to early intervention. Nonetheless, the implementation research projects undertaken in 2018 constituted about only 3.5% of all publicly funded research directed towards improving the lives of people living with ASD, a 0.2% increase since 2015.

Conclusions: Our analyses reveal a clear increase in applied research funding in the United States between 2008 and 2018 and focused on screening and diagnosis, with a marked increase in implementation research since 2014. These investments in testing new practices in community settings will likely encourage advocates focused on more immediate, real-world outcomes. It remains to be seen, however, if these new practices can be scaled up to impact early intervention outcomes at a meaningful scale.

421.063 (Poster) A Classification System of Autism Based on Eye Tracking Technology

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Background:

Early diagnosis of autism is critical for developmental improvement in autism. Due to the shortcomings traditional scale-assisted diagnosis methods, which are highly professional and lack objectivity, in recent years, eye-tracking technology to assist early diagnosis of autism in children has become a research hotspot in the field of autism. However, it is a challenge for researchers to use eye-tracking technology to mine effective eye movement physiological indicators to improve the objective and accuracy of early diagnosis of autism.

Objectives:

Our study therefore proposes and implements an early auxiliary diagnosis system for autism based on pupillary responses and gaze behaviors, which can objectively and efficiently assist autism diagnosis in children age 3-6.

Methods:

Our study designs an eye-tracking experiment based on pupillary responses and gaze behavior. Then two types of eye-tracking features, relative pupillary response features and relative fixation rate features in the area of interest, are extracted from the existing dataset.

The pupillary response experiment used a dataset of 75 subjects (including 25 ASD children and 50 TD children) for model creation and validation. A total of 45 subjects (including 19 ASD children and 19 TD children) participated in establishing and validating the model in the fixation-based behavior-based experiment. We fuse the two models in a joint decision-making way. Finally, an additional 20 ASD children and 13 TD children validated our model.
Results:

The two models have an average classification accuracy of 93.3% and 84.21% and an average AUC of 93.84% and 79.50%, respectively, with the leave-one-out cross-validation method. The experimental results show that the prediction results of the fusion model achieve a classification accuracy of 93.94% and an average AUC of 96.92%.

Conclusions:

By combining two eye-tracking experiments with a machine learning method, this study proposes a classification system that can be used to assist the identification of autism at an early stage of life. The system extracts key features from the data of eye-tracking experiments, selects the most predictive feature subsets, and constructs two independent parallel classifying models. The classification system proposed in this paper can provide clinicians with additional evidence to support the identification of children with autism, with an achieved performance in this study of 95.00% precision, 95.00% recall, 93.94% accuracy and 96.92% AUC.

421.064 (Poster) A Direct Comparison of Three Screening Methods for Siblings at High-Risk of Autism Spectrum Disorder

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Background: While universal screening for autism in a low-risk general population is not recommended, targeted screening of children at high-risk for autism is. However, many screening tools have been validated for use mainly in low-risk populations. There are also screening tools that rely predominantly on caregiver report, and others that involve direct observation by trained administrators, with consequent differences in cost implications in their implementation.

Objectives: To compare the accuracy of three autism screening tools as Level Two screeners in a population of siblings at high risk for autism. The tools are the Modified Checklist for Autism in Toddlers, Revised with Follow-up (M-CHAT-R/F), the ASDetect mobile app, and the Social Attention and Communication Surveillance, Revised (SACS-R).

Methods: Siblings, aged 12 to 30 months old, of children with confirmed autism were invited to undergo a structured screening programme at 12, 18 and 30 months old. This involved caregivers completing the M-CHAT-R/F and ASDetect at each visit, while the siblings were directly tested by trained nurses using the SACS-R. Although the M-CHAT-R/F is only validated for children 16 months and older, it was used at 12 months to compare its utility to the other screeners. The siblings then underwent an Autism Diagnostic Observation Schedule – Second Edition (ADOS-2) assessment at 36-48 months old. Sensitivity, specificity, positive predictive and negative predictive values for the three screening methods were computed.

Results: 189 siblings underwent screening (56.1% male; 60.3% Chinese, 29.1% Malay, 5.3% Indian). 76 were screened at 12 months, 117 at 18 months, and 140 at 30 months, with some being screened at more than one time-point. 33 withdrew and 156(82.5%) completed the ADOS-2. 56 met ADOS-2 criteria for autism spectrum, and 32 were confirmed to have autism while 9 did not meet full DSM-5 criteria. 15 of the 56 did not attend clinical evaluations to determine final diagnosis, hence were excluded from further analyses.

Conclusions: Although not validated for use at 12 months old, the M-CHAT-R/F had the best sensitivity for this age group. The ASDetect had the lowest sensitivity at all ages. The sensitivity of the M-CHAT-R/F declined with age, however, while the SACS performed better at 18 and 30 months, indicating differences possibly due to lenient caregiver-reporting versus more objective direct screening. Further evaluations on the highest discriminating items for each tool will be conducted. If targeted screening of high-risk children is to be conducted, the performance of tools developed for low-risk ASD screening should also be examined in higher-risk populations.

421.065 (Poster) A Multi-Modal, Multi-Informant Assessment of Daily Living Skills in Autistic Adolescents

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Background: Autistic adolescents without an intellectual disability (ID) often have daily living skills (DLS) that are 6-8 years behind same-aged peers and impact their ability to successfully transition to adulthood. Surviving and Thriving in the Real World (STRW) is the only known DLS intervention for autistic teens that targets hygiene, laundry, cooking, and money management skills. In a recently completed RCT, the STRW intervention led to significant gains in DLS on the Vineland Adaptive Behaviors Scales, 3rd Edition (VABS-3) caregiver report compared to a social skills control group (i.e., PEERS). However, in order to comprehensively understand how interventions may impact DLS in adolescents with autism, multiple assessment methods (e.g., questionnaire, daily phone diary, direct behavioral observation) and informants (e.g., caregiver, self-report) are needed.
**Objectives:** To assess the change in DLS of autistic adolescents who received either the STRW or PEERS interventions using a multi-modal, multi-informant DLS battery: (1) the Adaptive Behavior Assessment System, 3rd Edition (ABAS-3) self-report and caregiver questionnaire; (2) the DLS Direct Behavioral Observation (DLS-DBO); and (3) daily phone diaries (DPDs).

**Methods:** Participants included 48 youth with ASD (ages 14 to 16 years, M=15.3, SD=0.69; 72.9% male; 83.3% White) without an intellectual disability (IQ M=100.9, SD=10.3). Participants completed the DLS battery at baseline, were randomized to and completed STRW or PEERS, and then completed the DLS battery at post-treatment. Adolescent and caregiver participants completed the ABAS-3 which includes the Practical Domain that assesses DLS in the subdomains of Home Living, Community Use, Self-Care, and Health and Safety. At an in-person DLS-DBO, adolescents were assessed on their ability to cook on the stove and microwave, complete a load of laundry, and purchase items at a store using a predefined budget. Items were scored from 0-2 with higher scores indicating that tasks were done correctly and independently. Autistic teens completed DPDs on 3 consecutive days and reported on all activities that they completed over a 24-hour period. Each time a teen reported completing a DLS, they reported on whether it was done independently. The total number of DLS and independent DLS was calculated for each teen across 3 days. Descriptive statistics were calculated for DLS-DBO, DPDs, and the ABAS-3 at baseline and post-treatment. Change scores were computed and independent sample t-tests were used to test the differences between STRW and PEERS from baseline to post-treatment.

**Results:** See Table 1 for results. Participants in STRW made significant gains on the DLS-DBO (Laundry, Total), DPDs (total DLS, independent DLS), ABAS-3 Caregiver (Health and Safety, Community Use), and ABAS-3 Teen (Practical Domain, Home Living, Health and Safety, Self-Care).

**Conclusions:** Autistic adolescents in STRW demonstrated DLS improvements across different assessment methods and informants compared to adolescents in PEERS from baseline to post-treatment. Collectively, both parents and teens are reporting gains in all DLS areas targeted in STRW on the ABAS-3, and teens are demonstrating these gains via direct behavioral observation of laundry skills and self-report of independent DLS completed at home. Implications for assessment of DLS in adolescents will be discussed.

**Background:** Autism spectrum disorder (ASD) is a neurodevelopmental disorder that emphasizes early interventions for a better prognosis. Yet direct observations by trained administrators can often be time-consuming, while questionnaires or caregiver interviews can be subjective to factors such as parental awareness of ASD or human biases. Therefore, to overcome such shortcomings, there has been a high demand for a simple and objective approach to detecting risk signs of ASD in young children.

**Objectives:** The purpose of the study is to explore the effectiveness in detecting and classifying young children with or without ASD using a five-minute video sequence.

**Methods:** Key behaviors were selected from the Behavior Development Screening for Toddlers (BeDevel; Bong et al., 2021), a screening instrument for ASD that has demonstrated high sensitivity and specificity. Eight tasks based on initiation and response to joint attention, response to name, social referencing, eye contact, social smile, imitation, and pointing behaviors were used in the video sequence. The videos were shown on three TV screens with an actress who led each task and induced each key behavior. Cameras installed below the screens recorded the participants’ responses and were independently scored by two researchers. Kappa values (κ) were used to calculate agreement between the video sequence and the in-person BeDevel ratings. Classification and regression trees (CRT) were used to explore the hierarchical representations of interaction between the variables and the final prediction.

**Results:** A total of 110 young children, comprised of 75 participants with ASD (age M=31.37, SD=7.12, 18.7% female) and 35 non-ASD participants (age M=35.68, SD=5.81, 28.6% female), were included for analysis. Response to name, imitation, social smile, and pointing behavior showed fair strength of agreement (κ > .21). Based on the CRT analysis, eye contact, response to joint attention, and pointing behaviors were ranked as important variables in predicting final group classifications. Presenting both pointing behaviors and responses to joint attention in each of the respective tasks best classified young children into the non-ASD group. However, young children who did not show pointing behaviors and maintained satisfactory levels of eye contact in one task without response to joint attention or social smiles were classified into the ASD group. The overall prediction based on our model was 73.6% (Figure 1).

**Conclusions:** This pilot study demonstrates promising results in using a short video sequence to detect and screen for early ASD risk signs in young children.
Background:

Demand for formal diagnostic assessment of autism in adulthood has increased dramatically in the last 10 years in the UK and waiting times for assessment can be more than 2 years (Crane et al., 2018). Referral procedures need to ensure assessments are offered to those most likely to be diagnosed with autism to ensure the best use of limited resources. Information about diagnostic rates, characteristics of the population referred and post diagnostic outcomes can be of value to those seeking autism assessment in adulthood and those planning and managing services.

Objectives:

To answer the following questions through a systematic literature review:

1. What is the diagnostic rate for those entering the autism diagnostic pathway in adulthood in the UK?

2. Do the demographic characteristics of those assessed and diagnosed with autism differ from those not diagnosed with autism?

3. What is the response to the diagnostic outcome for those receiving a diagnostic assessment in adulthood? How does this differ between those diagnosed with autism and those not?

Methods:

Electronic databases Embase, APA PsycNET and Web of Science were searched and evaluated against the inclusion criteria - studies or reports of primary data from UK adult autism diagnostic assessment outcomes published June 2012 to January 2022. Studies reporting on non-primary data or clinician or parent/carer experience were excluded. The PRISMA statement was used for reporting the review. Studies were appraised using the critical appraisal skills programme (CASP).

Results:

14 studies met the inclusion criteria. 11 studies provided information on diagnostic rate. Average diagnostic rate was 53.77%, range <25 to 90%. Four studies provided information on age. Of these, three found a significant difference in age between those diagnosed with autism and those not, with those receiving a diagnosis being younger. Six studies reported on gender and of these only one found a significant difference in gender between those diagnosed and those not, with more males diagnosed than females in this case. Only one study provided information on ethnicity and here only 5% of those assessed were not white British. There was high incidence of psychiatric co-morbidity in both those diagnosed and those not diagnosed with autism. Only one study reported on the service user response to the assessment outcome and only in people diagnosed with autism. Emotional response to diagnosis and impact on life were mainly positive although this did vary. There was no information available on the experience and outcomes in those receiving assessment who were not diagnosed with autism.

Conclusions:

Based on this review nearly half of all adults accessing a diagnostic assessment of autism are not diagnosed with the condition. They are similar in demographic characteristics to the group diagnosed. There is no available information on outcomes for this non-diagnosed group.

This non-diagnosed group is of clinical interest due to their demands for clinical resources assigned to autism diagnostic assessment. The group also has possibly unresolved needs. Further information about this group and their outcomes would help with future service planning.

**421.068 (Poster) Accelerating Diagnosis of Autism Spectrum Disorder Using Asynchronous Telehealth Methodology**

Background: Early identification and treatment of autism spectrum disorder (autism) helps prevent additional problems later in a child’s life. However, long wait lists and long travel distances often make it difficult for parents to obtain timely evaluations. Telehealth technology has the potential to offer a significant advantage over traditional in-person assessments (IPA) for families with limited resources for a diagnostic assessment. Telehealth technology also provides clinicians with the ability to observe a child’s behaviors in natural environment (i.e., a home setting) while providing families with the ability to communicate with a clinician without having to incur the costs associated with long distance travel.

Objectives: The objective of this study was to compare the length of time from referral to the completion of a diagnostic evaluation between two groups of children randomly assigned to telehealth group or IPA assessments. This study was not designed to assess the validity of the telehealth diagnosis as that study was completed and published previously. A secondary objective was to gather information form parents regarding their experiences with telehealth or IPA assessment.

Methods: Three tertiary autism centers participated in this study; centers were located in Southeast, Southwest, and West. Recruited families were from consecutive self-referrals to the centers who were seeking an autism assessment for their child. Fifty-seven families from the surrounding urban and rural communities participated; children ages 18 months – 6 years participated in either an IPA (n=27) or a telehealth (n=30) assessment. Children were randomly assigned to the IPA or a telehealth assessment. IPA consisted of the regular assessment provided at each clinic, while the telehealth assessment was completed using the Naturalistic Observation Diagnostic Assessment (NODA™). NODA assessment included families capturing and uploading four video segments of their child at home, which expert clinicians reviewed and tagged for behaviors associated with autism as well as typical behaviors. The NODA proprietary system organized behavior tags according to the DSM-5 criteria for autism, which clinicians reviewed to determine final autism diagnosis. Parents received a summary report detailing the NODA or IPA assessment results and recommendations. Parent surveys were provided prior to receipt of feedback to gage their satisfaction with the assessment process based a Likert scale 1-5.

Results: Across the 3 sites, the average time from referral to diagnostic completion was 115 for the IPA and 66 days for the telehealth method (p < .001). Post participation satisfaction surveys were received 77% of participating families (IPA=21; NODA=23). Families positively rate the assessment as gathering important information about their child (4.57/5 for IPA and 4.13/5 for telehealth) and that they learned valuable information about their child (4.76/5 for IPA and 4.09/5 for telehealth). Families undergoing the telehealth assessment rated the process less favorably than the IPA (4.43/5 for IPA and 3.87/5 for telehealth).

Conclusions: This study found that video capture smartphone-based technology offered a significant timesaving option for families seeking an autism evaluation. Asynchronous telehealth evaluations are thus a promising method to facilitate autism evaluations and provide feedback to families regarding treatment options.

421.069 (Poster) Parental Concerns Regarding Social Emotional Reciprocity Deficits Correspond with Their Children’s Ultimate Diagnosis of ASD

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Background:

Social and developmental concerns are a common reason for parents to approach professionals for evaluation of their children. These concerns may suggest a possible autism spectrum disorder (ASD), but this is not always the case of the concerns. Assigning a definitive ultimate ASD diagnosis is challenging, especially at young ages and for the milder variants of the spectrum with preserved cognition. Better understanding of parental concerns and their correspondence to an ultimate diagnosis of ASD among this group is critical.

Objectives:

- To analyze which of the DSM-5 criteria for ASD are reflected in parental first concerns expressed during child evaluation.

- To compare parental concerns corresponding to DSM-5 criteria for ASD between groups of children receiving or not receiving an ultimate ASD diagnosis.

- To explore predictors (adaptive behavior and parental primary concerns) for an ultimate ASD diagnosis.

Methods:

Participants (N = 81, 24 females), aged 44–154 months, IQ>70 (range 72-122), underwent a comprehensive assessment for a possible ASD diagnosis using standardized tests in a tertiary autism center. The participants were divided into two groups based on their ultimate
diagnoses: ASD (n = 40, 8 females) or non-ASD (those not meeting diagnostic criteria for ASD, n = 41, 16 females). The groups were matched by sex, age, and IQ scores.

Parental first concerns were collected from the free description portion of introductory questions of the Autism Diagnostic Interview-revised. Each parental concern was analyzed as to whether it corresponded to one of the seven subdomains of the DSM-5 criteria for ASD.

Results:

Of the DSM-5 criteria for ASD reflected in parental reports of both groups, deficits in developing, maintaining, and understanding relationships was the most common concern (86%), followed by deficits in social-emotional reciprocity (58%), excessive adherence to routines (52%), hyper- or hypo-reactivity to sensory input (35%), stereotyped/repetitive behavior (26%), and highly restricted/fixated interests (21%). The least reported criterion was non-verbal communication deficits (12%).

Examining differences between ASD and non-ASD groups revealed that only the DSM-5 criterion for social-emotional reciprocity (as reported by parents) significantly distinguished between ASD and non-ASD groups, X²(1, N=81)=9.35, p=.002.

A logistic regression was performed to predict the likelihood of an ultimate diagnosis of ASD versus a non-ASD diagnosis based on the children's adaptive behavior and of parental concern regarding social-emotional reciprocity difficulty. The logistic regression model was statistically significant, (X²(2)=10.66, p=.005), and explained 17.0% (Nagelkerke R²) of the variance, with only one significant predictor: parental report of social-emotional reciprocity difficulty (β =.23, p=.001).

Conclusions:

Social difficulty was the most reported first concern expressed by parents seeking professional evaluation for a possible ASD diagnosis for their children, while non-verbal communication was the least. However, the only parental concern that distinguished between groups ultimately receiving ASD/non-ASD diagnoses related to impairment in social emotional reciprocity. These findings have important clinical implications for professionals during the early stages of parental interviews in the context of ASD evaluation and highlight the significance of first concerns regarding deficits in social-emotional reciprocity.

421.070 (Poster) Accuracy of Chinese Version of Autism Spectrum Rating Scale: Short Form (2-5 years) for Detecting Autism Spectrum Disorder in Toddlers

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Background: Previous studies showed early interventions were helpful to improve prognosis and outcomes of toddlers who suffer from autism spectrum disorder (ASD). There are a lot of screening tools for toddlers with ASD around the world. However, the screening tools for young children with ASD in Taiwan are inadequate. The Chinese version of Autism Spectrum Rating Scale: Short Form (2-5 years) (ASRS-C: SF 2-5 years; Yuan & Lin, 2015) could be one of the better screening tools for toddlers with ASD. It has shown decent sensitivity and specificity for ASD. However, there was only one study discussing ASRS-C: SF (2-5 years) in Taiwan as of today. Another issue is that most studies focused on mothers’ perspective, while few studies specially aimed at the role of fathers. Based on the above reasons, more comprehensive researches are required.

Objectives: The purpose of this study was to examine the accuracy of the ASRS-C: SF (2-5 years), as well as finding out whether different ways of parenting, involvement, or perspective between mother and father would influence the scale rating score.

Methods: This study recruited 132 toddlers with ASD and 73 toddlers with development delays (DD) before 36 months of age, and their parents as participants from the region of Kaohsiung and Chiayi in Taiwan. These toddlers came from both clinical referral and community. All of them are not diagnosed before the recruitment. This study used Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) to distinguish the diagnose ASD and DD. the ASRS-C: SF (2-5 years) was filled in by parents. Using Receiver Operative Characteristic (ROC) to determine the best cut-off score, and calculated sensitivity, specificity, and screening accuracy in ASD and DD group. Moreover, using t test to find out whether there was a significant difference between mother’s total score and father’s total score.

Results: In the total score of mothers, the cut-off was 31, yielding the sensitivity of .765, and specificity of .725. The area under the ROC curve of the ASRS-C: SF (2-5 years) was .776. In the total score of fathers, the cut-off was 30, yielding the sensitivity of .716, and specificity of .608. The area under the ROC curve of the ASRS-C: SF (2-5 years) was .736. Lastly, t test showed no significant difference between the total score of mothers and fathers.
Conclusions: The results of this study showed that the ASRS-C: SF (2-5 years) is an acceptable screening tool for the level 1. It could be used to help making a distinction between ASD and DD diagnosis in Taiwan. Though there were no significant different between the total score of mothers and fathers, the result presented higher sensitivity and specificity of the score of mothers rather than the score of fathers. This study provides additional evidence of mothers and fathers perspective of the ASRS-C: SF (2-5 years).

421.071 (Poster) Accuracy of the Chinese Version of the Modified Checklist for Autism in Toddlers, Revised with Follow-up: Brief Form
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Background: Autism spectrum disorder (ASD) is thought as an innate neurodevelopmental disorder and characterized by impaired social communication and social interaction, as well as restricted and repetitive patterns of behavior and interest. After diagnosis of their toddlers, parents could develop better coping strategies and make further adjustments. In addition, toddlers with ASD and parents could receive early intervention and family services. The benefits and effectiveness of early intervention highlighted the importance of earlier identification of toddlers with ASD. Among the numerous screening tools, the Modified Checklist for Autism in Toddlers, revised with follow-up (M-CHAT-R/F) is one of the most widely used and well-studied in early age. In Taiwan, there are rarely related validity studies of the Chinese version of M-CHAT-R/F (C-M-CHAT-R/F).

Objectives: The purpose of this study was to examine the accuracy of C-M-CHAT-R/F. In addition, C-M-CHAT-R/F was used to develop a brief form for detecting toddlers with ASD before 36 months of age in order to increase the utility of screening tools.

Methods: In this study, all participants were 170 toddlers with developmental disabilities aged 18-36 months, including 116 toddlers with ASD and 54 toddlers with developmental delays (DD). These participants were recruited from the Southwestern Taiwan, and all of them are not diagnosed before the recruitment. These caregivers of toddlers with developmental disabilities filled out C-M-CHAT-R/F. Following previous studies, the chi-square test (X² test) was used to find out the better discriminative items of the C-M-CHAT-R/F, which was regarded as C-M-CHAT-R/F: Brief Form (C-M-CHAT-R/F: BF). P < 0.01 were considered statistically significant. Moreover, using the receiver operating characteristic (ROC) to determine the best cutoff score and calculating sensitivity and specificity. Also, this study calculated positive predictive value (PPV) and negative predictive value (NPV).

Results: Using any three failed items of the 20 C-MCHAT-R/F as cutoff, the findings of this study yielding the sensitivity of .73 and specificity of .72. The PPV was .85 while the NPV was .56. The area under the ROC curve of C-MCHAT-R/F was .79. Also, this study found out 13 items with better discriminative power, including 1-item, 3-item, 6-item, 7-item, 8-item, 9-item, 10-item, 11-item, 15-item, 16-item, 17-item, 18-item, 19-item. These 13 items were set as new screening method, which was referred to as Brief 13. Brief 13 used any two failed items as cutoff, yielding the sensitivity of .74 and specificity of .59. The PPV was .59 while the NPV was .59. The area under the ROC curve of C-MCHAT-R/F was .81.

Conclusions: The results of this study suggested that C-M-CHAT-R/F can be used as the screening tool for detecting toddlers with ASD in high-risk group in Taiwan. The preliminary results of both C-M-CHAT and Brief 13 demonstrated an acceptable sensitivity and specificity. However, parents should be enhanced to heighten their awareness and knowledge of ASD early indications in rural area of Taiwan.

421.072 (Poster) Accuracy of the Developmental Behaviour checklist and the Strengths and Difficulties Questionnaire for Screening for ADHD Diagnoses in Autistic Children and Adolescents
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Background: ADHD (characterised by inattention and/or hyperactivity/impulsivity problems) co-occurs with autism at high rates. However, questionnaires developed to screen for ADHD are often not validated for use with autistic individuals.

Objectives: We examined the performance of two commonly used measures of child psychopathology (The Developmental Behaviour Checklist [DBC] and the Strengths and Difficulties Questionnaire [SDQ]) to screen for ADHD in autistic children. Longitudinal data from a well-characterised cohort (QUEST) was analysed to examine 1) the accuracy of measures for correctly distinguishing ADHD cases from non-ADHD cases, 2) whether the presence of common co-occurring conditions in this population such as intellectual disability or emotional disorders influenced accuracy, and 3) whether including teacher and parent report together improves accuracy.

Methods: Parents and teachers completed the DBC in early childhood (M=6.8 years), and the SDQ during mid-to-late adolescence (M=13.4 years for teacher report, M=15.4 years for parent report). Concurrent ADHD diagnoses were established using the Preschool Age/Child and Adolescent Psychiatric Assessment (PAPA/CAPA) from parent semi-structured interview (N=101 and 72 respectively). Receiver operating characteristic (ROC) area under the curve (AUC) analyses assessed screener performance for distinguishing cases. Sensitivity, specificity and correct classification statistics were obtained for pre-existing cut-points (where available) and/or Youden’s J identified optimal cut-
Investigating Autistic Symptoms in Sotos Syndrome: A Brief Report from a Case-Control Study


Background: Sotos Syndrome (SoS) is a rare (1:14,000) congenital condition caused in the 90% by abnormalities of NSD1 gene, characterized by facial dysmorphism and multiple organ overgrowth. A heterogeneous neuropsychological phenotype has been described, including variable cognitive impairment and behavioral difficulties. A possible association between SoS and ASD symptoms has recently been highlighted; however, to date, only few data are available and no prior studies investigated ASD symptoms in SoS through the administration of the Autism Diagnostic Observation Schedule–Second Edition -ADOS-2.

Indeed, based on the knowledge that some genetic conditions present ASD symptoms and that, similarly, 10–20 % of ASD is linked to genetic causes, it is therefore important to deeply investigate the presence of ASD symptoms within the SoS population. It could lead not only to a better definition of the SoS neuropsychological profile, but also to determine whether SoS could be implicated in ASD.

Objectives: 1. To investigate the presence of autistic symptoms in individuals with SoS 2. To characterize the socio-communicative profile in SoS, providing a comparison to an idiopathic ASD control group.

Methods: A sample of individuals affected by SoS (age range 2-18 years) was recruited. SoS individuals underwent a standardized evaluation of non-verbal IQ (Leiter-R). The presence of autistic symptoms was investigated through the administration of the ADOS-2, the Social Responsiveness Scale -SRS and the Social Communication Questionnaire-SCQ.

A control group of children with ASD - matched for age, sex and Intelligence Quotient (IQ) - was therefore included.

Results: Around 50% met clinical thresholds for ADHD during early childhood and 40% in adolescence (see Table 1 for cohort characteristics). AUC values for parent reports were acceptable, however, sensitivity for picking up ADHD cases was less than optimal for the specified cut-points on both the DBC and SDQ (see Table 2). Accuracy of teacher reports was not much more than chance and sensitivities were low. There were no statistically significant differences in accuracy of ADHD screeners by co-occurrence of intellectual disability or emotional disorders; this held across informants and timepoints. Adding in teacher reports did not statistically improve prediction of ADHD diagnosis from the parent-reported ADHD screener scores.

Conclusions: Although the DBC was not developed as an ADHD screening tool, both parent-reported ADHD questionnaires appear acceptable in detecting ADHD cases in autistic children in early childhood and mid-to-late adolescence. However, sensitivity was low. Teachers’ reports did not detect ADHD cases from non-ADHD cases with acceptable accuracy, but reports in adolescence were at a different timepoint from ADHD diagnoses. It should also be noted that although the PAPA/CAPA ADHD research diagnoses are based on parent reports, they do consider symptom pervasiveness. Tool accuracy was not influenced by co-occurring intellectual disability or emotional disorders, two common conditions in this population, although the reduced sample size in subgroup analyses may have decreased power to detect effects. Consideration of questionnaire item adaption may improve measurement precision. Comprehensive assessment from a range of informants, including direct observation of ADHD symptoms is required.

Conclusions: Our results highlighted that 72.7% of SoS individuals presented mild to moderate/high level of ASD symptoms as measured by the ADOS-2. Interestingly, an overlapping impairment in the social responsiveness scale emerged within SoS and ASD. Therefore, the
ASD symptoms’ assessment should be regularly performed in SoS children, with subsequent important implications in terms of therapeutic strategies and later outcome.

421.074 (Poster) Implementing Neurodevelopmental Pathways and Understanding Waiting Times for Neurodevelopmental Assessment and Diagnosis through a National Notes Audit in Scotland

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Background:

Neurodevelopmental assessment is time consuming, with wide variation in time-to-diagnosis. The Covid-19 pandemic has additionally stalled progress, changed how services are delivered and has led to increases in wait times for neurodevelopmental assessment and diagnosis.

Objectives:

This study presents new information on the development of an evidence-based pathway, as part of a Scottish Government funded project, to develop standards for neurodevelopmental assessment, and investigates duration of diagnostic assessment nationally following the COVID-19 pandemic, through retrospective notes audit. Recommendations for steps to improve provision are made, informed by evidence, professional and lived experience.

Methods:

In phase 1 we drew on the Medical Research Council (MRC) guidance for development of complex interventions to produce a new children’s pathway on neurodevelopmental terminology, assessment, diagnosis, triage, and time standards. The guidance recommended maximums for acceptance of referral to first appointment (84 days), first appointment to last appointment (154 Days), and for full waiting time from referral to diagnosis (252 days). In phase 2, a Scottish Government commissioned project investigated duration of diagnostic processes nationally. As there were no comparable targets for adults, we assessed child and adult pathways using the same standards. We completed a national notes audit, and applied two-stage non-probability sampling methods, with quotas for cases for all Scottish services proving children’s or adults neurodevelopmental assessment. Areas were allocated a quota dependent size and neurodevelopmental disorder referral rate. Cases were within the last 12 months, with a completed assessment, even if the outcome was no diagnosis.

Results:

71% of Scottish health boards agreed to participate, covering a population of c4.8M million (89% of Scottish population). 409 case notes were audited [children’s pathway N=206 cases, 62.62% males, mean age 8.99 years, range 1.42-17.92 years; adult pathway N=202 cases, 49.28% males, mean age 29.96 years, range 15.75-71.08 years]. Diagnoses received by children were: Autism (69.90%), Attention deficit hyperactivity disorder (20.87%), Developmental coordination disorder (2.43%), Developmental language disorder (1.46%), Intellectual disability (8.25%), other neurological or psychiatric diagnosis (8.25%) and no diagnosis (13.59%). For adults, diagnoses received were Autism (38.92%), Attention deficit hyperactivity disorder (45.32%), Developmental language disorder (0.99%), Fetal alcohol spectrum disorder (0.49%), Developmental coordination disorder (0.49%), Intellectual disability (5.42%), other neurological or psychiatric diagnosis (13.30%), and no diagnosis (13.79%). In children’s services, 43.20% of the cases received their first appointment within 84 days, 39.32% of cases completed the assessment process within 154 days, and 19.90% of cases achieved the overall 252 day target. For adults, 45.05% of cases received their first appointment within 84 days, 73.27% of cases completed the assessment process within 154 days, and 47.03% of cases met the overall 252 day target.

Conclusions:

The pathway and recommendations were adopted by the Scottish Government, with national reach. Phase 2 has identified problems in delays for children and adults seeking neurodevelopmental assessment. Our approach allowed for the collection of a rich detailed dataset, whilst also providing a useful method for services to reflect on their capacity. The work is part of an ongoing community of practice which will support change processes nationally.

421.075 (Poster) An Analysis of Sex Differences in Autism Spectrum Disorder Clinical Presentation in a Tertiary Care Clinic

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Background: Autism Spectrum Disorder (ASD) is diagnosed at a substantially lower rate in females compared to males (1:3) (Loomes et al., 2017). Recent research suggests that females with ASD may not be accurately diagnosed when evaluated (Ratto, 2020). Furthermore,
much of the research into sex differences in ASD presentation requires an ASD diagnosis for inclusion, omitting females who may be mis- or under-diagnosed by current ASD diagnostic measures (Ratto et al., 2018). Research into sex differences in ASD presentation requires inclusion of those currently falling through the diagnostic cracks to characterize this phenotypically diverse population.

Objectives: To explore sex differences in clinical presentation among children and adolescents referred for an ASD evaluation.

Methods: Participants included children and adolescents referred and clinically evaluated for an ASD diagnosis at a tertiary care clinic between 2006-2020. ASD symptom severity was evaluated using diagnostic algorithm scores from the Autism Diagnostic Interview-Revised (ADI-R), and comparison scores and domain-level calibrated severity scores from the Autism Diagnostic Observation Schedule (ADOS-G, ADOS-2). Sex differences in adaptive, cognitive, and language skills were assessed using measures administered during evaluation. Factorial ANOVAs were conducted to examine interactions and main effects of sex and ASD diagnosis on ASD symptom severity and skills, and Chi-Square tests of independence were conducted to examine likelihood of reaching diagnostic algorithm cutoffs and receiving an ASD diagnosis by sex.

Results: Participants included 1,099 total individuals, with 54.8% of the sample diagnosed with ASD (Table 1). Factorial ANOVA indicated a main effect of sex for ADOS RRB domain scores (Table 2), such that females referred for an ASD evaluation had lower RRB scores than males. Chi-Square tests of independence indicated that females were more likely to reach the ADI-R algorithm cutoff for RRBs compared to males ($\chi(1) = 6.25, p = 0.012$), and that males were more likely to receive an ASD diagnosis compared to females ($\chi(1) = 5.12, p = 0.024$). Factorial ANOVA indicated a significant interaction between sex and ASD diagnosis for expressive language ($F(1, 813) = 4.05, p = 0.044$), such that females diagnosed with ASD had lower expressive language scores ($M = 66.42, SD = 17.69$) than males diagnosed with ASD ($M = 69.42, SD = 18.53$), whereas females not diagnosed with ASD had higher expressive language scores ($M = 71.45, SD = 17.22$) than males not diagnosed with ASD ($M = 68.88, SD = 16.07$).

Conclusions: In a clinical sample of individuals referred for an ASD evaluation, females were more likely to have clinically significant RRBs reported by caregivers than males, although males exhibited greater observed RRB severity than females. Overall, likelihood of ASD diagnosis was higher for males compared to females. An interaction between sex and ASD diagnosis on expressive language aligns with camouflage theory, suggesting that compensatory skills may mask ASD symptoms for females, resulting in lower diagnostic rates. Future research into sex differences should continue considering those missed by diagnostic procedures, as these findings suggest quantifiable sex differences in factors influencing ASD diagnosis among those referred for an ASD evaluation.

Objectives: To compare clinical presentation among school aged children who are minimally verbal across caregiver and therapist contexts.

Methods: All participants received a social communication intervention (Kasari et al., 2021; Smith et al., 2001) as a part of a registered intervention trial (Clinical Trial: NCT01751698). Inclusion criteria were that children must: (1) be between 5-8 years old, (2) use less than 20 spontaneous words on a language sample, and (3) have a non-verbal cognitive ability greater than 12 months. Descriptive information is provided in Table 1. The BOSCC (Grzadzinski et al., 2016) was coded from two contexts, a play interaction between children and their caregivers (CCX) and therapy session with their primary therapist (TCX). BOSCC Core Total and Social Communication (SC) domain scores were calculated across both contexts at entry (T1), 6-weeks (T2) and 16-weeks (T3) after study entry. Change over time was analyzed using linear mixed effects models with participant included as a random intercept and time (T1, T2, T3), context (TCX, CCX), and their interaction included as fixed effects. Treatment outcomes for this trial will be reported in a pending paper.

Results: At T1 there was a small to moderate correlation between BOSCC TCX and CCX Total scores ($r=0.32; p <.001$) and SC domain scores ($r=0.28; p <.001$). Further, there was a significant interaction between time and context where children saw a significantly greater reduction (signifying improvement) in BOSCC SC Domain scores between T1 and T2 ($b=-2.86, SE=0.71, p<0.001$) and between T1 and T3 ($b=-2.98, SE=0.70, p<0.001$) in the TCX compared to the CCX condition. This effect was also seen in Total BOSCC scores from T1 to

Objectives: To evaluate whether the BOSCC is sensitive to change over time in a sample of school-aged minimally verbal children with autism and whether the amount of change differs based on administration contexts.

Methods: All participants received a social communication intervention (Kasari et al., 2021; Smith et al., 2001) as a part of a registered intervention trial (Clinical Trial: NCT01751698). Inclusion criteria were that children must: (1) be between 5-8 years old, (2) use less than 20 spontaneous words on a language sample, and (3) have a non-verbal cognitive ability greater than 12 months. Descriptive information is provided in Table 1. The BOSCC (Grzadzinski et al., 2016) was coded from two contexts, a play interaction between children and their caregivers (CCX) and therapy session with their primary therapist (TCX). BOSCC Core Total and Social Communication (SC) domain scores were calculated across both contexts at entry (T1), 6-weeks (T2) and 16-weeks (T3) after study entry. Change over time was analyzed using linear mixed effects models with participant included as a random intercept and time (T1, T2, T3), context (TCX, CCX), and their interaction included as fixed effects. Treatment outcomes for this trial will be reported in a pending paper.

Results: At T1 there was a small to moderate correlation between BOSCC TCX and CCX Total scores ($r=0.32; p <.001$) and SC domain scores ($r=0.28; p <.001$). Further, there was a significant interaction between time and context where children saw a significantly greater reduction (signifying improvement) in BOSCC SC Domain scores between T1 and T2 ($b=-2.86, SE=0.71, p<0.001$) and between T1 and T3 ($b=-2.98, SE=0.70, p<0.001$) in the TCX compared to the CCX condition. This effect was also seen in Total BOSCC scores from T1 to
T2 (b=-2.63, SE=0.80, p<0.001) and from T1 to T3 (b=-3.04, SE=0.79, p<0.001). Change scores across the CCX and TCX from T1 to T2 were not significantly correlated for either SC Domain Scores (r=-0.04; p=0.62) or Total BOSCC Scores (r=-0.01; p=0.87) nor from T1 to T3 (r=-0.01; p=0.87 and r=-0.03; p=0.75 respectively). See Table 2 for mean scores across time.

Conclusions: While progress was seen across both assessment contexts, larger and sustained change was seen in BOSCC’s coded from TCXs compared to CCXs. It is also notable that a significant portion of the observed change across both contexts occurred within the first 6-weeks of the treatment and then seemed to plateau. It will be important to evaluate the effects of supplementing and modifying treatment on children’s progress.

421.077 (Poster) Investigation of Shifts in the Phenotypic Measures and Sociodemographics of Autism Spectrum Disorders

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Background: Autism spectrum disorder (ASD) is a highly heterogeneous condition, motivating large cohort studies. As the data for such studies may be collected over the span of several years, changes in participant demographics, assessment instruments, and diagnostic constructs may result in data shifts across time. These shifts can confound the analyses of these data, further increasing the heterogeneity of research findings in ASD.

Objectives: Our objective was to examine data shifts in recruitment practices, participant demographics, symptom domains, and adaptive functioning in the Province of Ontario Neurodevelopmental Disorders (POND) cohort.

Methods: We use data collected through POND from 2012 to 2021. The sample consisted of 853 children and youth with a diagnosis of ASD (age=11.3±3.65 years; 21.2% female). Autism traits, ADHD symptoms, and obsessive compulsive symptoms were quantified using the Social Communication Questionnaire (SCQ), Strengths and Weaknesses of ADHD-symptoms and Normal Behaviour (SWAN), and the Toronto Obessive Compulsive rating scale (TOCS). Externalising and internalising symptoms, IQ, and adaptive functioning were measured using the Child Behaviour Checklist (CBCL), the Wechsler family of measures and Stanford-Binet (SB), and the Adaptive Behaviour Assessment System Second Edition (ABAS-II). The time variable was computed as the time elapsed since the inception of the POND network (2012). Linear regression was used to test if there was a main effect of time (i.e. a data shift) for each of the above measures as well as participants’ age, sex, family income and education level. The data were transformed (Box-Cox/Yeo-Johnson) and the regression analysis was repeated for the results with non-normal residuals.

Results: Linear regression results revealed a small, but significant decrease in time for CBCL-externalizing (coeff=-0.28±0.1234, R2 = .01, F(1, 804) = 5.17, p = .023) and TOCS (coeff=-0.73±0.3096, R2 = .07, F(1, 827) = 5.63, p = .018), and a significant increase for FSIQ (coeff = 0.77±0.3455, R2 = .01, F(1, 676) = 5.31, p = .0215). Time effects for the ABAS-II, SCQ, SWAN, and CBCL-internalizing were not significant. For demographics, our results showed a significant decrease in percentage of participants with household income below the provincial median (coeff=-0.03±0.01, R2=. , F(1)=3.14, p=0.01), but not in age, proportion of females, and primary caregiver’s education level.

Conclusions: Overall, we found small but significant data shifts in the POND cohort. These findings motivate the inclusion of time as a potential covariate in future studies.

421.078 (Poster) Artificial Intelligence Identification of Autism Using a Smart Tablet Serious Game for Preschool Children: Results from a Phase 3 Diagnostic Trial of 779 Children in Sweden and the United Kingdom

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Background:

Early detection of autism spectrum disorder (ASD) allows early intervention and potentially the best lifelong health outcomes. However, ASD’s complex symptomatology makes diagnosis complex, time-consuming and requires specialist clinical input. Waiting times for diagnosis can be many months or years. Recent evidence suggests the motor system is linked with autism aetiology, providing an accessible modality for computational assessment. Further, most children with or without autism are attracted to smart tablet gameplay. Its touch screen and inertial sensors enable collection of reliable motor kinematic and behavioural data, suggesting a promising new route for accessible, scalable early assessment. This study set out to test promising pilot results of an iPad serious game assessment paradigm (Anzulewicz, Sobota, & Delafield-Butt, 2016) with a gold-standard blinded, multi-site phase 3 diagnostic trial (Millar, McConnachie, Minnis, et al., 2019).

Objectives:

To determine the predictive accuracy of a serious smart tablet game for the early identification of autism using pre-trained algorithms naïve to trial data collected in two sites using blinded comparison against clinical diagnosis.

Methods:

A registered phase 3 prospective, diagnostic classification study (NCT03438994) tested the predictive accuracy of a smart tablet serious game with artificial intelligence data analytics to identify autism. Three cohorts aged 3 – 6 years participated: children typically developing (TD); children with a clinical diagnosis of autism (ASD); and children with diagnoses of other non-autism neurodevelopmental disorders (OND). 779 children were recruited from Scotland (Glasgow) and Sweden (Gothenburg). Children played two 5-minute games on an iPad. One commercial algorithm and four research algorithms were trained on a previous cohort of children collected prior to this trial (n=767). Algorithms were tested naïvely on these new, blinded trial participant data to classify gameplay patterns as positively or negatively associated with an ASD diagnosis. Classification results then compared against medical diagnosis by a clinical trial unit. Strengths and Difficulties Questionnaire (SDQ), ESSENCE-Q, and adaptive function scores were collected for a subset of participants. Sensitivity and specificity of the algorithms to differentiate ASD children from TD children are reported.

Results:

694 participants (331 TD, 185 ASD, and 178 OND) were included in the final analysis. Research algorithms produced up to 0.80 sensitivity and 0.84 specificity. The commercial algorithm underperformed with sensitivity of 0.29 and specificity of 0.47. Peak performance was obtained by the combination of research algorithms and SDQ, yielding up to 0.95 sensitivity and 0.95 specificity. Differences in accuracy between genders, ages, sites, and severity levels will be discussed.

Conclusions:

This phase 3 diagnostic accuracy study of a digital health smart tablet assessment of autism demonstrates sensitivities and specificities useful in clinical diagnostic pathways. Furthermore, the assessment is based on computational analysis of motor patterns, indicating strong predictive value of the motor system in early identification of autism. Performance can be enhanced by the inclusion of a brief questionnaire additionally taking into account social and emotional factors. Future work is required to further improve algorithms and develop this system into a clinic- or school-ready tool amenable to integration with screening, assessment or diagnostic pathways.

421.080 (Poster) Assessment of ‘Subtle’ ASD Using the M-ASD Questionnaire: A Validation Study

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Background:

There are concerns of underrecognition of autism spectrum disorders (ASD) in women, because of subtler manifestations of social and communication difficulties, and less evident repetitive behavior (APA, 2022). Women, but also men, with more subtle ASD manifestation suffer in silence, because their autism is not recognized.

A timelier identification could lead to better prognosis, prevent secondary problems, reduce family stress and societal costs (García-Primo et al., 2014). We developed the M-ASD (50 items; Bezemer & Blijd–Hoogewys, 2018), an instrument that also considers these ‘subtle’ ASD manifestations (INSAR poster 2018 & 2022).

Objectives:

Validating the M-ASD in a clinical setting.
Methods:
Retrospective diagnostic data from a clinical sample, suspected of ASD, referred to a general mental healthcare institution, were analyzed. All underwent extensive ASD diagnostic assessment, which included the M-ASD and the AQ (Baron-Cohen et al., 2001).

The research group consisted of 603 adults (see Table 1), of which 65% received an ASD diagnosis (ASD group). The others received other psychiatric diagnoses (non-ASD group). A sub-group participated in retesting the M-ASD \( (n = 21; \text{max} = 2-8 \text{ weeks interval}) \).

For analyses, M-ASD total-scores and AQ total-scores were used (both range 0-50, based on dichotomous item-scoring). Descriptive statistics, correlations, T-tests, Cronbach’s alpha, ROC and PPV/NPV-analyses were performed.

Results:
Cronbach’s \( \alpha \) for the M-ASD was .935; correlation with the AQ was strong \( (n = 603; r = .749, p <.001) \). The test-retest reliability of the M-ASD was excellent \( (n = 21, M_1 = 24.81, SD_1 = 11.45; M_2 = 25.62, SD_2 = 11.96; r = .95, p <.001) \).

The ASD total group had a significantly higher M-ASD total-score than the non-ASD total group (see Table 2). The same was true for women and men. All consisted of large effects, except for a medium effect in men. Also, ASD women had a significant higher M-ASD total-score than ASD men \( (p <. 001; \text{Cohen’s } d = .346) \).

The AUC for the total group was .718 \( (p <.001) \). The best Youden’s index resulted in a cut-off score of 26 for women, and 20 for men. Sensitivity was .527 for women and .569 for men. Specificity was .838 and .747 respectively. Positive predictive value was 86% for women and 80% for men; negative predictive value was 53% and 50% respectively. In both women and men, in 63%, the M-ASD and the clinical diagnostic agreed regarding the classification of ASD \( (C^\text{women}(1,341) = 42.46, p < .001; C^\text{men}(1,262) = 24.43, p < .001) \). Agreement was fair for both women \( (K = .309) \) and men \( (K = .285) \).

Conclusions:
The internal consistency and test-retest reliability of the M-ASD is excellent. Sensitivity and specificity findings are in line with other ASD questionnaires in a clinical setting. ASD women scored higher on the M-ASD than ASD men, indicative of more ASD problems.

One should keep in mind that there was still a large group of ‘missed patients’ based on the M-ASD (50-52%). Diagnosis remains a clinical one and should not be based on a particular questionnaire.

421.081 (Poster) Autistic Adults’ Perspectives and Experiences of Play-Based Assessments Administered By Professionals
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Background: Professionals often observe and note play behaviours for the purpose of autism diagnostic assessment. However, play-based assessments tend to focus on deficits and are based on comparisons to non-autistic ‘norms’. According to the neurodiversity paradigm, it is important to center autistic voices and promote a holistic perspective on difficulties, differences, and strengths. As there is a lack of understanding about how autistic people think about and experience play-based assessments, focusing on autistic perspectives on this topic can inform how professionals can better implement play-based diagnostic assessments in the future.

Objectives: To understand autistic adults’ experiences of assessments of play used by professionals.

Methods: Consultation with autistic and non-autistic stakeholders informed the topic and approach. Semi-structured interviews were conducted with 22 autistic adults aged 18-57 (either clinically confirmed diagnosis or self-diagnosed) who live in the UK. Autistic stakeholders were consulted about the interview procedures and questions. Participants were asked about their perspectives and experiences of play-based assessments and could reflect on childhood or contemporary experiences. To identify themes, the interview transcripts were analysed using interpretative phenomenological analysis.

Results: Three themes were identified relating to: (1) type of assessment; (2) benefits of using play; (3) issues around using play. Autistic adults’ experiences were varied, with some completing diagnostic assessments like The Autism Diagnostic Observation Schedule (theme: type of assessment). Participants discussed the benefits of using play in diagnostic contexts, such as play giving useful insights into autistic ways of being and play differences that could be identified in this context. Participants also discussed a variety of issues around using play, such as issues relating to autistic heterogeneity and deficit-focused assessment.
Objectives: To assess whether group differences in response to the SenseToKnow app are specific to autism and the effect of pre-term birth on the computer-vision-based proposed metrics.

Methods: In total, 449 toddlers participated (mean age at administration was 20.9 months, SD = 3.6 months). Subgroups included those who were born full-term (>37 weeks) with (n = 28) and without autism (n = 349) and those born premature (<37 weeks) with (n = 12) and without (n = 60) autism. Diagnosis was based on the ADOS. Participants were assessed in clinic-based settings using the SenseToKnow app, which displays brief, strategically designed movies on a tablet while the child’s behavioral responses are recorded using the camera embedded in the device. Computer vision was used to extract information related to (1) gaze (e.g., percent time attending to social vs. non-social stimuli, and clustering of gaze in coordination with speech of actors in the movies) (2) how often and quickly participants responded to their name being called, and (3) frequency of head movements while watching the app. A 2 (premature vs. full-term) x 2 (autism vs. no autism) MANOVA was used to assess the effects of prematurity and autism on the variables described above.

Results: Only autism diagnosis emerged as a significant predictor for the outcomes as a group, $F(1,287) = 7.51, p < .001, \eta^2_p = .22$, neither prematurity, $F(1,287) = 1.67, p = .08, \eta^2_p = .06$, nor the interaction between autism diagnosis and prematurity reached significance, $F(1,287) = 1.76, p = .06, \eta^2_p = .06$. Specificity of outcome measures was dependent on the stimulus type and measures selected. For example, attention to social relative to non-social stimuli was more strongly associated with autism, $F(1,297) = 26.01, p < .001$, than prematurity, $F(1,297) = 5.33, p = .02$ (Fig 1). In contrast, gaze clustering on one or the other speaker in a dialogue was significantly related to prematurity, $F(1,297) = 6.53, p = .01$.

Conclusions: The SenseToKnow app shows promise for early detection of autism in toddlers. This study presents further evidence that certain behavioral features quantified with computer vision analysis may be specific to autism rather than other conditions such as pre-term birth.


Background:

Anorexia Nervosa (AN), a severe eating disorder, is typically diagnosed in adolescence (Westwood & Tchanturia, 2017), while Autism Spectrum Disorder (ASD), a neurodevelopmental disorder, typically emerges early in life (APA, 2013). Research suggests a possible link between ASD and AN (Kerr-Gaffney et al., 2021) although this association needs to be investigated further (Ormond et al., 2017).

Objectives:

The aim of this pilot study is to characterize past and present behaviors of adolescent girls with AN who are referred for the first time for ASD evaluation. The objectives of this research were to characterize early developmental and emotional variables in order to try to understand why the diagnosis of ASD was postponed until adolescence. An additional objective was to help medical and psychological professionals that treat AN in adolescent girls to both detect and treat possible ASD characteristics.
Methods:

This is a pilot study of cases of four adolescent girls who were hospitalized in the psychiatric department of Hadassah Medical Center in Jerusalem, Israel due to severe Anorexia. The girls were referred by the medical and psychological staff for an ASD evaluation due to difficulties in their social skills and social adjustment. The participants’ parents were interviewed using the ADI-R and the girls were diagnosed with ADOS2 and additional information from questionnaires (SRS, SCARED, ABAS-II). All cases were brought to general consultation with the department staff to help establish an appropriate treatment plan.

Results:

All the participants had been diagnosed with general anxiety at preschool age; two of the girls were also diagnosed with selective mutism. Social challenges from early childhood were reported although the girls weren’t referred to ASD diagnosis, perhaps due to the fact that their social difficulties were perceived to be part of their anxiety. The eating disorder, later diagnosed as AN, began in early adolescent (12 to 16 years). The ADI and ADOS demonstrated challenges in social communication and intense preoccupation with social relationships, restricted eating and methods for losing weight.

Conclusions:

These preliminary findings may suggest that ASD symptoms in adolescents with eating disorder were less obvious or misdiagnosed in early childhood. The emergence of eating disorder probably highlighted the ASD symptoms which helped in the current diagnosis process. The results of this pilot case study reflect the importance of earlier detection and diagnosis of ASD that can help treatment and even reduce future AN symptoms. Further investigation in this area is necessary.

421.084 (Poster) Clinical Correlates of Head Size and Diagnostic Certainty in Autism


Background: Research suggests that a relatively large fraction of autistic individuals can be identified by experienced clinicians within a short timeframe. “Frank” autism describes this part of the autism population that expert clinicians quickly identify as autistic with high certainty. Nevertheless, the specific signs and characteristics that are associated with a high diagnostic certainty still remain unclear. Previous studies have found macrocephaly (i.e. large head size), to be associated with autism, and correlated with measures of intelligence and autism symptoms.

Objectives: The study is an investigation of the association of clinicians’ certainty of an autism diagnosis with head size, autism symptomatology, and other clinical signs in a large heterogeneous sample of individuals with autism. We also investigated how associations between signs and diagnostic certainty vary depending on the child’s age. Furthermore, we explored how head circumference correlated with IQ measures and with items of the ADI and ADOS.

Methods: The Simons Simplex Collection is a database of approximately 2800 autistic individuals and contains item-level scores for different assessment tools and tests, head circumference at time of assessment, as well as a measure of the clinician’s certainty of the given autism diagnosis. Associations between certainty and clinical signs were investigated using simple correlations, and by machine learning using ensembles of decision trees. The dataset was split into subsets according to the age of assessment, and the analyses were performed on each of these subsets. Robustness of the findings was assessed by bootstrapping. Head circumference was normalized by age, sex, height, weight, and genetic background and was correlated with IQ, diagnostic certainty, and ADI and ADOS items.

Results: Rates of highest-certainty diagnoses were found to differ significantly depending on language level (ADOS module) and age at assessment. Normalized head circumference had a positive association with certainty across ADOS modules, most pronounced in ages up to 10. Additionally, ADOS items complex mannerisms and unusually repetitive behaviours and interests were positively associated with certainty, particularly at young ages. 85% of individuals with normalized head circumference above the 97.5th percentile were diagnosed with the highest possible certainty. Head circumference correlated with several items in the communication and social interaction domains, which was consistent across individuals assessed with different ADOS modules. Furthermore, larger head circumference was significantly correlated with a lower verbal-IQ/nonverbal-IQ ratio among those assessed with ADOS module 2, even when controlling for differences in IQ tests.
Conclusions: The results show a correlation in autistic individuals between head size and the likelihood that they are recognized as autistic with the highest certainty. Furthermore, several autism symptoms correlated with head size, while others showed no such correlations. The results indicate that large head size is associated with a specific profile of autism, and that this profile may be aligned with a “frank” presentation of autism that clinicians recognize with high certainty.

421.085 (Poster) Comparison of the Psychometric Properties of a Mobile Application for Early Autism Detection (ASDetect) for Caregivers with and without Prior Concerns

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Background: Early autism identification facilitates children’s developmental outcomes. ASDetect is a caregiver mobile application for early autism detection in 11-30-month-olds. Based on a psychometrically robust developmental surveillance tool for autism (Social Attention and Communication Surveillance-Revised; SACS-R; Barbaro et al., 2022), it contains short, narrated videos demonstrating key social-communication behaviours, followed by a question; automatic calculation of children’s ‘likelihood’ for autism (high/low) is then presented.

Prior data shows ASDetect has excellent psychometric properties for early autism detection (87% positive predictive value (PPV); 91% negative predictive value (NPV); 73% sensitivity; 96% specificity). It was of interest to compare the psychometrics of ASDetect for caregivers with and without prior concerns, based on previous research showing that parental/caregiver concerns alone is a strong predictor of autism (Sheldrick et al., 2019).

Objectives: To determine differences in the psychometric properties of ASDetect between caregivers with and without prior concerns about their child’s development.

Methods: 1,808 children aged 11-30 months were registered for the study. Caregivers provided family details on the study webpage, downloaded ASDetect, indicated if they had any concerns about their child’s development (e.g., language, social-communication, motor, emotion regulation, behavioural), and completed an ASDetect assessment. Caregivers were also invited to complete the Social Responsiveness Scale-2 (SRS-2) when their child was 30 months old. All children at ‘high likelihood’ for autism on ASDetect were offered a free diagnostic assessment by the ASDetect team. Children at ‘low likelihood’ for autism, but whose caregivers were concerned about their child’s development, and those who met the SRS-2 cut-off score at 30-months, were also invited for an assessment. Children were assessed by blinded clinicians at intake and every 6 months until 24-30 months, using ADOS-2, ADI-R, and cognitive/adaptive assessments.

Results: 1,547 (86%) caregivers completed at least one ASDetect assessment for their child, with 745 (48%) having prior concerns. 327 children (21%) were identified at ‘high likelihood’ for autism (307 with, and 20 without, prior concerns).

Based on the diagnostic assessments, in the “prior concerns” group, ASDetect had 88% PPV, 80% NPV, 76% sensitivity, and 90% specificity. In the “no prior concerns” group, ASDetect had 75% PPV, 98% NPV, 47% sensitivity, and 99% specificity. The prevalence of autism in the “prior concerns” group was 49%, and 4% in the “no prior concerns” group.

Conclusions: ASDetect is highly predictive of an autism diagnosis, whether prior caregiver concerns are present or not. However, ASDetect is more predictive, and sensitive, when caregiver concern is present, although even caregivers using ASDetect without prior concerns were more likely to have autistic children (4%) than current general population prevalence (2%). Sensitivity was lower in the “no prior concerns” sample, but specificity was very high. Thus, caregivers without prior concerns may under-report their child’s autism signs, or signs may become clearer across time and, therefore, identified at a later age. These finding stress the importance of caregiver education on the early sings of autism, and the addition of a 42-month ASDetect check, shown to significantly increase sensitivity of the SACS from 62% at 24-months to 96% by 42-months.

421.086 (Poster) Correct Classification of Adults As Autistic or Typically Developing, Based on Self and Parent Reports

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Background: The last decade has seen an increase in the diagnosis of autism in adults (Brugha et al., 2016; Dietz et al., 2020). However, although research has shown that even in adulthood, parent-report predicts diagnosis better than self-report (Poon et al., 2020), screeners for individuals seeking an ASD diagnosis in adulthood tend to focus mostly on self-report, and less on parental report. The potential value of parent report may be different for females, compared to males, since research has shown that parents often struggle to spot signs of autism in females (Little et al., 2017). Two relevant screening tools for adults with ASD are the Autism-Spectrum Quotient (AQ; Baron-Cohen et al., 2001) and the Relative’s Questionnaire (RQ; Baron-Cohen et al., 2005), which are self and parent-report questionnaires (respectively) used for screening adults without intellectual impairment who seek an ASD diagnosis.
Objectives: To test the added value of using a parent-report tool in addition to a self-report tool in improving the correct classification of adults as autistic or typically developing (TD). We will also examined the contribution of self and parent reports to correct classification in males and in females, separately.

Methods: AQ, RQ, and demographic data of 116 clinically diagnosed autistic adults (30 females) aged 17.5–54 (M=25.89, SD=7.40) were retrieved from client records of two tertiary centers that provide diagnostic assessment services for adults with autism. A waiver of consent for this retrospective records review was obtained. One hundred and eight TD adults (21 females) aged 18-50 (M=23.60, SD=3.55) completed the AQ, and their parents completed the RQ.

Results: Binary logistic regressions were computed for the entire sample and for males and females separately to examine whether AQ and RQ were associated with the likelihood of having an autism diagnosis, controlling for participants’ age. The analysis conducted for the entire sample (shown in Tables 1 and 2) revealed the AQ and the RQ (over and above the AQ) significantly contributed to the model. The entire model explained 90% (versus 79% without the RQ) of the group’s variance and correctly classified 95% (versus 90% without the RQ) of cases. When the logistic regression was conducted separately for males and for females, the picture was similar for males, but adding the RQ over the AQ did not significantly improve the model for females (Table 2).

Conclusions: Our results confirm the contribution of parent report screeners for adults seeking an autism diagnosis. However, a separate examination for males and females showed that the RQ had no added value in the correct classification of female participants to the autism or TD groups. This can be explained by the fact that the AQ in females explained 100% of the variance, creating a ceiling effect but may also highlight parents’ difficulties to recognize autistic traits in females. Future research should examine different reporter-type screening tools against a larger sample and against additional clinical populations that may mask autistic traits when relying solely on one reporter.
PedsQL:GC, which could potentially be explained by the use of a real world dataset with no specific intervention designed to impact HRQoL. These analyses add to the current literature on the use of PedsQL:GC in ASD, with shorter test-retest intervals and further longitudinal evaluation in an interventional dataset required.

**421.088** *(Poster)* Cumulative Risk Factors and Children with Profound Autism

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**Background:** Accurate representation of children with autism in research studies can be difficult, particularly when discussing children with profound developmental delays. Children with profound delays can present challenges that require specialized training and experience. Researchers also face challenges recruiting families across various socio-demographic backgrounds. Families with a higher set of cumulative risk factors including single-parent status, poverty, minority status, and limited maternal education are more likely to drop out from research interventions (Bagner and Graziano, 2013). Some of these factors may also predict intellectual disability in children with autism (Pinborough-Zimmerman et al, 2012).

**Objectives:** To explore how demographic risk factors may be predictive of children with profound developmental delay

**Methods:** The current study is a secondary analysis of 156 minimally verbal autistic preschool-age children enrolled in a public, mostly Title 1 school-based intervention study. All families completed demographic questionnaires and all children were assessed prior to receiving intervention using the Mullen Scales of Early Learning (MSEL), a standardized measure commonly used to assess cognitive development in children with ASD. Seventy percent of the sample tested below the range needed to determine a valid early learning composite score, the equivalent to an IQ score. This represents a subset of the overall sample we consider to be children with profound developmental delays. We compared this subset with the rest of the sample and analyzed potential demographic predictors of families with a profoundly delayed autistic child. To do this we looked at potential risk factors that include maternal education (high school or below), single-parent status, minority status, family size, and the presence of a sibling with a developmental disability. Risk factors were dichotomized and summed to provide a cumulative risk index.

**Results:** Logistic regression analyses explored the relationship between risk factors and profoundly delayed children. Maternal education, single parent status, minority status, and the presence of a sibling with developmental delay did not individually predict profound developmental delay. Family size did significantly predict profound developmental delay ($\beta = -.74, p < .01$). Households with more children than adults were more likely to have a child with profound developmental delay. We then explored the potential role of cumulative risk and found cumulative risk was a significant predictor of having a child with profound developmental delay ($\beta = -.35, p < .05$). Families with higher scores on the cumulative risk index were more likely to have a child with profound developmental delay.

**Conclusions:** Our study demonstrates that demographic risk factors can have a cumulative effect in predicting profound developmental delay in children with autism. We know that individuals with profound delays are often excluded from research studies, and our findings highlight potential demographic barriers leading to a lack of representation. Researchers face many challenges in recruiting and enrolling individuals with profound disabilities, and it is important to consider ways to address these barriers. Bringing research to the community through school-based interventions is one way to remove these barriers for families already at higher risk. Thus, it is imperative to accommodate families in different socio-demographic circumstances.

**421.089** *(Poster)* Daily Activity Participation across Settings in Autistic Youth: Individual Variability and Temporal Stability

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**Background:** Participation in daily-life activities is often linked to functional independence and well-being, yet there remains a paucity of such evidence among autistic youth. Most investigations focused on group comparisons with non-autistic peers for narrowly defined categories of activities (e.g., leisure activities) in particular settings (e.g., home), with few opportunities to examine individual differences in a broader range of settings and how participation patterns may change over time among the heterogeneous autistic population.

**Objectives:** We aimed to identify subgroups of autistic youth based on parent-reported activity participation frequency at home, school, and community settings via the Participation and Environment Measure for Children and Youth, as well as their associations with youth characteristics, family demographics, and environmental supportiveness (i.e., to what extent the social/cognitive/physical/sensory demands
of activities support youths’ participation). We also examined whether the participation patterns remained stable from early (ages 11-14; T1) to middle adolescence (ages 14-16; T2).

**Methods:** The current sample (N=158) was drawn from the Pathways in ASD study, a longitudinal inception cohort in Canada. Latent profile analysis was performed for each setting to determine cross-sectional profile structures at both timepoints, followed by latent transition analysis with repeated data. Household income and caregiver education, environmental supportiveness, youth’s nonverbal IQ (WASI-II/Leiter-R-Leiter-3), and autism symptom severity (ADOS) were included as covariates of T1 latent profiles, which were then compared on their T1 adaptive functioning (VABS-II) and challenging behaviours (CBCL), adjusting for classification uncertainty.

**Results:** Three-, three- and two-profile solutions were selected respectively for home, school, and community settings at both timepoints (entropy .99-1.00, indicating high distinction between profiles; Figure 1). The most prevalent profiles were characterized by frequent home participation (HP3; 73%), low participation in non-classroom activities at school (SP1+SP2; 65%), and low community participation, particularly in social gatherings (CP1; 80%), indicating participation imbalance across settings. Youth with higher nonverbal IQ who experienced higher environmental supportiveness were more likely to be in the more active participation profiles across settings (Table 1). Those classified into the active participation profiles tended to have higher adaptive functioning ($\chi^2=7.23$ to 86.42, all $p<.01$) and lower levels of externalizing behaviour ($\chi^2=4.91$ to 14.05, all $p<.05$), but did not differ from lower participation groups in internalizing behaviour. Latent transition analysis indicated overall 75% stability in profile membership over approximately one year, with a different home participation profile characterized by limited self-care activities emerging at T2.

**Conclusions:** The results demonstrated the variable activity participation patterns among autistic youth as associated with individual, family, and environmental factors, thus stressing the need for optimizing person-environment fit to promote their participation across settings. Our longitudinal analyses revealed that most of the “movers” shifted to a higher home or school participation profile later, indicating opportunities for increasing participation in these settings among subgroups of autistic youth. However, the overall stabilizes levels of community participation across adolescence reinforces the need for continuous supports and inclusive efforts in community settings. These findings indicate that monitoring autistic youth’s participation over time can inform timely supports for individual changing needs at this crucial developmental stage.
imperfections (high ASD-psych), a group showing low ASD symptoms but elevated psychopathology (psych), and a group whose scores indicated typical development (TD). Additionally, when classes were split by sex, there was an even distribution in all three groups of males; however, females were less represented in the high ASD-psych group compared other groups. When classes were split by ASD status, as expected of the 44 children who were in the high ASD-psych group, most (28) met criteria for diagnosis; however, 16 remained undiagnosed. When classes were split by sex and ASD status, a higher percentage of boys (67.74%) in the high ASD-psych group received a diagnosis than girls (53.85%).

Conclusions: These results indicate that transdiagnostic subgrouping within a HL sample can identify clinically relevant groups. HL females are less likely to exhibit the symptom profiles more in line with an ASD diagnosis and even among the ones who do align with that profile, fewer are diagnosed than males. Thus, familial risk for ASD may be differentially expressed in males and females and diagnostic criteria based on male presentation may hinder the identification of females on the spectrum.

421.091 (Poster) Developing a Character Strength Profile of Australian Autistic Adolescents

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Background: The field of positive psychology has introduced a new perspective of studying personality with a focus on character strengths (CS), defined as positively valued traits that individuals manifest through thoughts, feelings, and behaviours. The VIA Classification of Strengths was developed to define and categorise the 24 key character strengths and the six overarching virtues which they reflect.

Research has found multiple positive outcomes are predicted by CS, and evidence with neurotypical samples have suggested a positive association between the endorsement of CS and an individual’s satisfaction with life. However, less work has been done surrounding the CS of the neurodiverse population, despite growing empirical evidence supporting strengths-based models.

Objectives: This study seeks to address this short-coming by identifying the signature CS in autistic adolescents to better inform support programs.

The development of a CS profile would enable more effective support in the transition to adulthood, as well as open avenues for autistic adolescents to use their strengths in a meaningful way, improving participation outcomes and life satisfaction.

Methods:

Character strengths data from a sample of autistic adolescents (aged 13 to 17 years; n = 45) were isolated from a larger research project for independent analysis. The data consisted a parent-proxy report of The Global Assessment of Character Strengths-24 (GACS-24), in which the key 24 character strengths are rated on a 7-point Likert-scale ranging from “very strongly disagree” to “very strongly agree” in terms of how natural and effortless they are to express. Data was analysed through median comparisons to identify the significantly rated strengths among the autistic adolescent sample.

Results:

The median rating for each strength is reported in figure 1. Within group, there was a statistically significant difference in the rating of strengths, $\chi^2(23) = 212.33$, $p < .001$. Post-hoc analysis identified ten strengths that were significantly different to the overall median (Figure 1).
Conclusions:

Humour, Kindness, and Love were found to be the most natural and effortless strengths to express, consistent with the findings of existing qualitative research in which parents identified these strengths in their autistic adolescents. As such, these strengths are considered integral components of the character profile of autistic youth which should be fostered in pre-transition supports. Overall, eight strengths rated significantly higher than the median, while only two rated significantly lower. This suggests that carers draw a clearer distinction between strengths that are characteristic of their adolescent, compared with those that are not.

Furthermore, the lower rated strengths, such as Self-Regulation and Social Intelligence, are consistent with the diagnostic criteria of autism spectrum disorder and the reported challenges for autistic youth in the transition to adulthood. This highlights areas where extra support may be necessary for successful transition.

Further analysis with qualitative data from the same sample will seek to analyse the content of the questions and look for correlations between the strengths and behaviours of autistic adolescents. Future research should investigate the strengths of younger and older age groups to gain an understanding of the development and refinement of CS across maturity.

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Background:

Training parents in the delivery of intervention programs has revealed better and lasting benefits for their children with Autism Spectrum Disorder (ASD). Parent-mediated Interventions are technique-focused, where the parent is the agent of change, and the child is the direct recipient of treatment.

Objectives:

To develop and validate a parent-mediated joint attention training manual for a parent-mediated joint attention intervention in the Indian context

Methods:

Numerous joint attention activities were collated from various sources, as journal articles, text books, internet, and parent training guides, as an initial step to develop the parent-mediated joint attention training manual. A consensus Delphi method was implemented to obtain consensus for the developed parent-mediated joint attention training manual. A total of 15, interdisciplinary group of experts across India, with a minimum experience of 5 years of working in the field of ASD, were selected to participate in the study. The Delphi process involved two rounds of consensus seeking. The first round comprised of validation of joint attention activities a parent-mediated joint attention intervention. The collated set of joint attention activities was shared with all the experts via Microsoft forms for agreement using a 5-point likert rating scale for the proposed joint attention activities.

The parent-mediated joint attention training manual comprises of a section of parent coaching. The parent coaching module's framework and components were developed and validated in the second round of the Delphi process. Here again, the same set of experts rated each component of the intervention module, i.e., structure of each session, frequency of parent coaching, feasibility of parent implementation, and time allotment using a 5-point Likert rating scale. Responses were collected and analysed to check for the experts' consensus on a preset agreement level of 70% for each parameter for both rounds. The researcher computed the ratings following each round and addressed suggestions received by the experts on the parent coaching and joint attention activity manual.

Results:

For round 1 of Delphi method, percentage agreement was calculated for all 5 parameters across experts on the Likert scale. Figure 1 shows the percentage agreement obtained across experts for round 1 of the Delphi process. Besides, minor modifications were suggested for 9 joint attention activities in this round. Figure 2 shows the percentage agreement obtained across experts for round 2 of the Delphi process. The suggestions given by the experts were incorporated into the parent coaching module. The modified versions of the module with summary of results were shared with the experts after each round.

Conclusions:
The study, thus, presents the development and validation of a parent-mediated joint attention activity manual for children with ASD using a robust e-Delphi method. The results of the validation showed good agreement across experts on a range of relevant parameters, offering a reliable resource for the intervention of children with ASD. Future implication can test the efficacy of this parent-mediated joint attention activity manual in facilitating joint attention skills in children with ASD in a parent-mediated joint attention intervention program.

**421.093 (Poster)** Development of a School-Age Extension of the Modified Checklist for Autism in Toddlers through Expert Consensus  

Background: Current recommendations for the detection of early signs of autism include 18- and 24-month screening (Hyman et al., 2020). Notably, it is estimated that the number of children diagnosed with autism by age 4 is about 30% lower than that of children diagnosed by age 8 (Christensen et al., 2016; Soke et al., 2017). This suggests that toddler screening and early detection strategies might miss children who show either a) stronger compensatory strategies during early childhood, making autism symptoms less noticeable, or b) have co-occurring conditions, like intellectual disability, that may overshadow autism symptoms. Children may also be missed because they are not screened, not referred, or do not present for diagnostic evaluation following early screening. This project adapts the Modified Checklist for Autism in Toddlers, Revised with Follow-up (M-CHAT-R/F; Robins et al., 2014), for use in school-age children, called M-CHAT-School (M-CHAT-S).

Objectives: To use a Delphi poll to develop a screening questionnaire for detecting children at higher likelihood of autism between the ages of 4 to 8 years.

Methods: Researchers developed a list of potential items informed by other screening tools, thorough review of literature, and their own clinical expertise. Each item was rated by four researchers/clinicians for which DSM-5 criterion the item best fit and whether it was appropriate for young school-age children. Top items for each category were shared with scientist-practitioner experts in diagnostic assessment of autism to offer two rounds of feedback. Experts were asked to rate the quality of the item (e.g., importance of symptom, clarity of wording), relevance to verbal and/or minimally verbal school-age children, appropriateness for parent and/or teacher informants, and to provide overall feedback. In round 2, poor items were eliminated, and feedback was shared in aggregate form. Experts re-rated the remaining items, after reviewing the aggregate feedback, to develop the final item set.

Results: Review of existing screening tools yielded 438 items which were rated by four clinicians/researchers. From these, the most highly rated items (n=65) across all the DSM-5 criteria were shared through the Delphi poll. In round 1, 35 experts (4 male) completed the Delphi poll. Of these, 24 identified as researcher or scientist, 5 as clinical providers or educators, and 6 as both. Majority were in the discipline of psychology (n=27), with an average of 24 years (range 9-46) experience working with autistic individuals. Based on the feedback, 26 items were retained for round 2, with wording changed based on feedback. In round 2, 29 of the 35 experts completed the survey in full and provided further feedback on items and screener format. Based on this feedback, 24 items were retained, and 2 open-ended questions were added.

Conclusions: Through expert consensus feedback, we developed the 26-item M-CHAT-S, to be used with young school-age children. Future steps involve obtaining input on the items from caregivers of school-age children as well as educators working with autistic children, and psychometric testing to create a valid and reliable measure to identify children with autism who are undiagnosed by early school age.

**421.094 (Poster)** Development of an Assessment Tool to Detect Anxiety in Autistic Individuals Who Speak Few or No Words  
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Background: Despite mental health problems being prevalent, there are a lack of assessment measures for mental health for autistic people with intellectual disability (ID), particularly people who speak few or no words. Assessment measures that are currently used have limitations, including not being sensitive to the profile of behaviours observed in autism, or inclusion of behavioural indicators of distress that overlap with physical health issues (e.g. pain). These limitations may lead to mental health difficulties being missed.

Objectives: To develop an assessment tool for the detection of anxiety that is suitable for autistic individuals who speak few or no words.

Methods: A new assessment measure for anxiety was developed through a process of reviewing literature on behavioural indicators of anxiety and anxiety assessments, and by interviewing clinicians (N = 9) and parents of autistic individuals (N = 21) about anxiety related behaviours. 311 parents/carers of children and adults with ID (with and without a diagnosis of autism) then completed the newly developed assessment measure. Participants with ID ranged in age from 4-83, (M= 21.59, SD= 12.00); 61.4% were male, 67% spoke no/few words, 50% had an autism diagnosis. Test-retest reliability was collected from a subset of participants. Convergent validity was ascertained by
Background: Early identification of autism spectrum disorder (ASD) is critical for timely access to early intervention. Artificial intelligence and machine learning algorithms are innovative, cost-effective approaches to increase access to clinical services. Despite recent progress in digital autism phenotyping, there are no established objective methods to measure core ASD features at the transition between the ASD prodromal period and symptom onset (Age: 14 months). As the field accelerates into the digital era, there is a prime opportunity to develop accessible mobile technology to improve the objectivity and granularity of remote automated measurement of core social communication behaviors in young children.

Objectives: Using an interdisciplinary approach, we aim to develop an automated, digital, movement-based measure to improve the early identification of core ASD features involving social communication behaviors.

Methods: We apply an established video-based automated movement tracking pipeline (Corman et al., 2021) to a well-phenotyped and characterized, prospective, longitudinal dataset of 14-month-olds at elevated (EL) and low likelihood (LL) for autism with 36-month diagnostic outcomes (Landa et al., 2020). Participants in the current sample include 46 toddlers at elevated and low likelihood for ASD with diagnostic outcomes of ASD (n=22; 73% male) or non-ASD (n=24; 42% male) based on the ADOS, DSM-5 ASD criteria, and clinical best estimate. Using dense manual annotations by research reliable coders, a neural network is then trained to recognize salient social communication behaviors from video segments (e.g., gaze to face, gaze to object, gesture to face, gesture to object, etc.). Because we are interested in the co-occurrence of specific social communication behaviors (e.g., gaze to an object plus gesture to an object), we train a single model to predict the presence of multiple behaviors for a given instance in time.

Results: Using 17% of the current participant sample for each of the validation and test splits and the rest for training, our preliminary results show that even training on a subset of the data with single frame pose and object keypoints gives ~64 mean average precision (mAP; a metric commonly used by the machine learning community for multi-label classification tasks [Liu et al. 2018]) with average precision (AP) as high as 82.4 for gaze to objects. Intuitively, the metric (minimum=0; maximum=100) captures the fraction of correct classification among those classified as positives averaged over all behaviors and thresholds.

Conclusions: Our current movement-based model recognizes subtle differences in social communication behaviors that differentiate 14-month-olds with and without later ASD. We anticipate that as our sample size grows, results will improve. In contrast to previous digital phenotyping efforts, we aim to incorporate rich scene information into our models. This will be a critical next step for moving this metric beyond traditional lab-controlled settings to home-based, unconstrained video recordings of parent-child interactions.

421.095 (Poster) Development of an Automated Movement-Based Measure for Digital Autism Phenotyping Prior to Age 2

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Development of an Objective Autism Risk Index Using Arabic Remote Eye Tracking Paradigm

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Background:
Deficits in eye gaze are a hallmark feature of autism spectrum disorder (ASD) and are included in gold standard diagnostic instruments. More than a decade of research into abnormalities of eye gaze has confirmed social attention deficits as a key feature of ASD. Across studies, diverse stimulus paradigms have elicited social attention abnormalities, ranging from decreased fixation to others’ eyes and social scenes as early as 6 months of age, to gaze abnormalities during dyadic or joint attention bids in preschoolers and older children, to aberrant gaze toward dynamic social stimuli in older high-functioning individuals.

Gaze patterns, particularly those based on dynamic temporal analysis, may be a promising objective risk marker of ASD as well as a quantitative measure of autism symptoms spanning the full continuum of behavior. Developing an Arabic version of eye tracking stimuli paradigm mimic the English ones used by previous studies to be used for Arabic speaking individuals is challenging but promising.

Objectives: The primary aim of the present study was to create an objective, eye tracking-based autism risk index using Arabic version stimuli paradigm.

Methods: Children were recruited for comprehensive multidisciplinary evaluation of ASD and subsequently grouped by clinical consensus diagnosis (ASD n=106, non ASD 100). Remote eye tracking using Arabic version stimuli. Dwell times were recorded to each priori-defined region of interest (ROI) and averaged across ROIs to create an autism risk index.

Results: Similar to the previous findings, the autism risk index had high diagnostic accuracy with area under the curve (AUC) = .89 and .84, 95% CIs=.80-.97 and 070-.95, was strongly associated with Autism Diagnostic Observation Schedule-Second Edition severity score.

Conclusions: The autism risk index is a useful quantitative and objective measure of risk for autism in at-risk settings. Using the Arabic remote eye tracking paradigm proved to be as effective as the English version used in previous research projects. Future research in larger samples is needed to cross-validate these findings. If a validated scale for clinical use, this measure could inform clinical judgment regarding ASD diagnosis and track symptom improvements.

Background: Concerns have been raised that standardized diagnostic instruments like the Autism Diagnostic Observation Schedule-2 (ADOS-2) would be less sensitive for girls than for boys with autism spectrum disorder (ASD), due to lower scores for girls than boys on the ADOS-2. Research on the validity of the ADOS-2 in boys and girls with and without ultimate DSM ASD diagnoses may add knowledge on the diagnostic utility of the ADOS-2 in general practice.

Objectives: The present study investigated the validity of the ADOS-2 in young boys and girls undergoing diagnostics, in relation to their best estimate DSM classification (ASD or non-ASD).

Methods: Retrospective ADOS-2 and other diagnostic data from a clinical sample of 681 children (n=507 ASD, n=174 non-ASD; aged 2-6 years), referred to a mental health clinic, were analyzed. Due to concerns of ASD that emerged at any point in their diagnostic trajectory, an ADOS-2 was administered. The percentage of agreement between the ADOS-2 classification and the DSM ASD classification was calculated for boys and girls. Chi-square tests (p < .05) were performed to test whether significant differences in percentage of agreement existed. Kappa’s, sensitivity, specificity, positive and negative predictive value were established for boys and girls separately. To further investigate possible differences in boys and girls with and without a DSM ASD classification on the Social Affect (SA) and Restricted and Repetitive Behavior (RRB) ADOS-2 domain scores, ANCOVA’s were performed with age as covariate.

Results: Boys and girls with and without a DSM classification of ASD did not differ on age and IQ. In 81% of all children, the ADOS-2 and the DSM classification agreed regarding ASD without sex differences (boys 82%, girls 77%; C^2 (1) = 1.7, p = .19). Agreement was fair for girls (κ.37) and moderate for boys (κ.49). Sensitivity was .85 for girls, .92 for boys. Specificity was .53 for girls, .52 for boys. Positive predictive value was .85 for girls and .84 for boys, negative predictive value was .51 for girls and .71 for boys. Boys with clinical ASD diagnoses had higher SA (7.1) and RRB (6.4) calibrated severity domain scores compared to girls with clinical ASD diagnoses (6.5, p <.05; 5.9, p <.05 respectively).

Conclusions: In a sample of young children referred for diagnostic assessment, the ADOS-2 and the ultimate DSM classification had fair agreement. Sensitivity and specificity findings are in line with earlier research. The fair level of agreement for girls seems to be explained mainly by a low predictive value of a negative test, indicating that young girls with a clinical DSM ASD classification do not always reach the cut-off on the ADOS-2. Additionally, although boys with a DSM classification of ASD scored statistically significantly higher than...
girls on both ADOS-2 domains, the clinical relevance of this finding seems small: mean severity levels of ASD-symptoms are similar for boys and girls with a DSM classification of ASD, i.e. of moderate concern.

421.098 (Poster) Different Symptom Measures Sensitive to Different Symptom Groups of Children with Autism Spectrum Disorder
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Background: The Social Responsiveness Scale, Second Edition (SRS-2) and Childhood Autism Rating Scale™, Second Edition (CARS-2) are useful assessments for identifying symptoms of autism. Moreover, the CARS-2 is available in two versions, namely, the standard (CARS-ST) and high functioning (CARS-HF) versions, to address different symptom levels of children with autism spectrum disorder (ASD). The three measures may have different focuses on autism symptoms. To use the measures more appropriately in clinics and for research, it is essential to investigate the associations among the CARS-ST, CARS-HF, and SRS-2.

Objectives: The aims of the study were to investigate (1) the consistency of symptom levels between the CARS-ST and CARS-HF, and (2) the correlations among the CARS-ST, CARS-HF, and SRS-2.

Methods: Children aged 3 to 12 years with a diagnosis of ASD were recruited in our study. The SRS-2 and CARS-2 were used to assess the children’s autism symptoms. All children were assessed with the CARS-ST, and their caregivers were asked to complete the SRS-2. Children aged more than 6 years with Verbal Comprehension Index scores > 80 were additionally assessed with the CARS-HF. Cohen’s Kappa coefficients (κ) were used to investigate the consistency of symptom levels between the CARS-ST and CARS-HF. Pearson correlation coefficients were used to examine the correlations among the CARS-ST, CARS-HF and SRS-2.

Results: A sample of 207 children with ASD was recruited in the study. The mean age of the children was 6.5 years (SD= 2.2), and most of them were boys (85.2%). All the children were assessed with the CARS-ST and SRS-2, and 48 were additionally assessed with the CARS-HF. The results revealed that the CARS-ST had high correlations with the CARS-HF (r = 0.945, p < .001). The consistency of severity levels between the CARS-ST and CARS-HF was low (κ = 0.02). Children identified as “minimal to no symptoms” on the CARS-ST tended to be identified as “mild to moderate symptoms” on the CARS-HF. Moreover, children identified as “severe symptoms” on the CARS-HF tended to be identified as only “mild to moderate symptoms” on the CARS-ST. The correlations between the CARS-ST and the SRS-2 were low to moderate (r = 0.26–0.44, p < .001), while the correlations between CARS-HF and the SRS-2 were moderate to high (r = 0.56–0.73, p < .001).

Conclusions: Consistent with the design purposes of the CARS-2, the CARS-ST is sensitive to children with typical ASD, and the CARS-HF targets children with high functioning ASD. Moreover, the correlations between the CARS-2 and the SRS-2 revealed that, like the CARS-HF, the SRS-2 may also be more sensitive to children with high functioning ASD. Better understanding of the associations among the CARS-ST, CARS-HF and the SRS-2 will help clinicians and researchers choose suitable measures when addressing autism symptoms.

421.099 (Poster) Early Features of Autism in Genetic Conditions Associated with Intellectual Disability: The Role of Development
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Background:
Down syndrome (DS) and fragile X syndrome (FXS) are genetic conditions partially characterized by elevated likelihood for co-occurring autism spectrum disorder (ASD). Estimated co-occurrence rates are ~20% and 60% for DS and FXS respectively; consequently, empirical and clinical efforts to identify co-occurring ASD during early development have increased. However, the early delays associated with eventual intellectual disability and some limitations of available diagnostic tools for these populations pose challenges for early detection and differential diagnosis in these conditions.

Objectives:
In 12 – 24-month-old children with DS and FXS, we aimed to 1) characterize infant profiles of ASD features; 2) determine the correspondence between ASD features from 12 – 24-months; 3) examine the association between developmental level and ASD features; and 4) evaluate differences in these patterns between DS and FXS.

Methods: Participants included 34 infants with DS and 32 with FXS. The Mullen Scales of Early Learning (MSEL) provided a nonverbal mental age (NVMA) estimate derived from Visual Reception and Fine Motor Age Equivalent Scores. Measures also included the Autism Observation Scale for Infants (AOSI) total raw scores, and the Autism Diagnostic Observation Schedule – 2nd Edition (ADOS-2) Toddler Module Social Affect and Restricted/Repetitive domains domain raw scores, where higher scores indicate elevated symptomatology. We
Background: Autism spectrum disorder (ASD) is thought as an innate and long-life neurodevelopmental disorder and characterized by impaired social interaction and communication, as well as restricted and repetitive behavior and interest. Thus, it is important for early detecting and early diagnosis in toddlers with ASD before 36 months of age. However, the diagnosis of ASD poses particular difficulty because there are no biomarkers used in diagnostic process. Over past decades, some studies reported that prevalence of ASD has increased markedly. However, compared to Western countries, the prevalence of young children with ASD in Taiwan is still lower. Previous studies reported that early intervention improved outcomes for toddlers with ASD (Clark et al., 2018; Landa et al., 2011; Rogers et al., 2019). The benefits of early intervention highlighted the importance of earlier identification of toddlers with ASD. Knowing the importance of early identification, the American Academy of Pediatrics (AAP) has recommended that all infants receive universal screening for autism less than 24 months of age (Johnson et al., 2007). However, the diagnosis of ASD is still often delayed because some factors, including limitations in utility of screening instruments etc.

Objectives: The current study, there are two studies to examine the utility of using the Taiwanese version of the Screening Tools for Autism in Two-Year-Olds: Short Form (T-STAT: BF) for toddlers with ASD before 36 months of age.

Methods: The T-STAT is a 12 items interactive autism-specific screening tool, including four behavioral domains: Play (2 items), Requesting (2 items), Joint attention (4 items) and Imitation (4 items). This study examined the discriminatory power of all item of the T-STAT and then yield the T-STAT:BF.

Results: Study 1, there are 40 toddlers with developmental disabilities, including 20 toddlers with ASD and 20 toddlers with developmental delays (DD). The chi-square test ($\chi^2$ test) was used to decide the strongest discriminatory items from the T-STAT. Finally, 5 out of 12 items were selected ($p < .003$), including Play: Turn-Taking, Requesting: Food and Bubbles, and Joint Attention: Bag of Toys and Balloon. Each item of the TSTAT:BF is scored as 0 (pass) or 1 (fail). Using signal detection procedures, the optimal cutoff of the T-STAT:BF score was decided. The results revealed that 3 was the best cutoff. Using the 3 of the T-STAT:BF score as cutoff, the sensitivity and specificity are .85 and .90, respectively. In addition, positive predictive value (PPV) is .89 and negative predictive value (NPV) is .86. Study 2, there are 201 toddlers with developmental disabilities, including 83 toddlers with ASD and 118 toddlers with DD. Using the 3 as cutoff, the sensitivity and specificity are .92 and .84, respectively. In addition, PPV is .80 and NPV is .93.

Conclusions: The findings of the current study showed that the T-STAT:BF is a promising good tool to differentiate toddlers with ASD and those with DD before 36 months of age. The finding of this study could provide implications for early identification.
421.101 (Poster) Evaluating the Overall Utility of Measures of Functioning for School-Aged Children on the Autism Spectrum

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Background: Autism is a neurodevelopmental condition characterised by social and communication differences, and the presence of persistent, repetitive behaviours, which can impact an individual’s ability to function in everyday life. Due to the heterogeneous nature of autism, the functional impact can vary significantly between individuals. However, it is becoming increasingly important to accurately measure functioning in individuals on the autism spectrum, to ensure equitable access to services, supports, and funding. Currently, the highest prevalence of autism is in school-aged children, which encompasses a critical period of development, during which children are developing their identities and required to function across multiple contexts.

Objectives: To evaluate the overall utility of measures of functioning suitable for use with school-aged children on the spectrum, including the content validity of these measures in relation to the International Classification of Functioning, Disability and Health (ICF) and ICF Core Sets for Autism.

Methods: A scoping review of the literature was conducted in two phases. First, relevant measures of functioning suitable for school-aged children were identified. Then, targeted literature searches were conducted to identify articles reporting on the psychometric properties of the eligible measures. The Outcome Measures Rating Form (OMRF) was used to evaluate the overall utility of the measures. Content validity of the measures for school-aged children on the autism spectrum was determined by identifying the meaningful concepts in each item and linking these to the ICF and ICF Core Sets for Autism, following established ICF linking rules.

Results: Thirteen measures of functioning were identified for inclusion in the review. The methodological quality of studies evaluating their psychometric properties were predominantly strong. Psychometric properties varied between assessments, with the Adaptive Behaviour Assessment System (ABAS-3) receiving the highest overall utility rating on the OMRF. Content validity of the measures against the ICF and ICF Core Sets for Autism also varied; very few measures considered the influence of Environmental Factors on functioning. The ABAS-3 had the greatest total number of codes linking to the Comprehensive ICF Core Set for Autism while the Vineland Adaptive Behaviour Scales had the greatest number of unique codes linking to both the Comprehensive ICF Core Set for Autism and the Brief ICF Core Set for Autism (6-16 years).

Conclusions: Assessing functioning of school-aged children on the spectrum can be challenging. However, it is important to accurately capture the unique strengths and challenges of this population, to ensure a holistic understanding of their functioning and needs for support. Although a variety of measures currently exist that are suitable for assessing functioning of school-aged children on the spectrum, there is currently no single measure best suited for this purpose. Health professionals should consider their psychometric properties, including content validity for this specific population, when selecting an appropriate measure to aid them in determining the level of functioning of school-aged children on the spectrum.

421.102 (Poster) Evaluation of Psychometric Properties and Factorial Structure of Social Communication Questionnaire in Rural Kenya

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Background: Children can be reliably diagnosed with autism spectrum disorder (ASD) as early as three years of age, and early interventions are initiated (Guthrie et al., 2013). There is often a significant gap between the age of onset of symptoms (2-3 years) and diagnosis (8-10 years) in Africa (Bakare et al., 2019). Due to diagnostic delays, the initiation of interventions that could improve developmental outcomes are not carried out early on. Screening and diagnostic efforts, regardless of a child’s age, require the use of appropriate measures that are valid and reliable. This can be challenging, particularly in the African context, where we have a limited number of mental health care providers and limited culturally appropriate tools for screening and diagnosis (Abubakar et al., 2016). Given these limitations, we conducted a study to validate the social communication questionnaire (SCQ) as a screening instrument in a rural setting in Kenya.
Objectives: We specifically aimed to examine the performance of the SCQ by assessing its reliability, confirming the factorial structure, testing the specificity and sensitivity of the SCQ through receiver operative curves (ROC) analysis, and while using an item response theory (IRT) framework, examine the item difficulty and discrimination.

Methods: The study was conducted in Kilifi and Mombasa counties, along the Kenyan Coast, where the healthcare systems for mental and neurodevelopmental disorders are not under-resourced. 172 of the study participants had a neurodevelopmental disorder (NDD) diagnosis, with 84 of these including children with an ASD diagnosis and 112 controls. Participants were recruited from special schools and neurology clinics in the two counties. Verbal and written consent were sought from all parties. Statistical analysis was done using STATA version 15 and R statistical software (version 3.6.3). Internal consistency was evaluated through the use of Cronbach’s alpha, confirmatory factor analysis (CFA) with maximum likelihood procedure to assess the conceptual model for the SCQ. Additionally, the sensitivity and specificity of cut-off scores using ROC analysis by comparing the overall SCQ score against case-control status, difficulties and discrimination quality using an IRT framework was also assessed.

Results: Factor analysis revealed an adequate fitting model for the three-factor DSM-IV-TR (root mean squared error of approximation (RMSEA) = 0.050; Comparative Fit Index (CFI) = 0.974; Tucker-Lewis Index (TLI) = 0.973) and two-factor DSM-5 factor structure (RMSEA = 0.050; CFI = 0.972; TLI = 0.974). The reliability coefficient alphas for the whole group for all items (Cronbach’s α = 0.90) and all three domains (Cronbach’s α = 0.68 – 0.84) were acceptable to excellent. The recommended cut-off score of 15 yielded 72% sensitivity and 100% specificity in the ASD group compared to the typically developing group. In comparison, a cut-off score of 7.5 yielded a sensitivity of 90% and specificity of 98% in this group.

Conclusions: The present study provides early evidence of the adequate factor structure and more than acceptable internal consistency of the SCQ. We also note that the recommended cut-off yielded sufficient predictive validity. We will further report the item functioning of the SCQ.

421.103 (Poster) Examining Inter-Rater Reliability and Assessment Fidelity of the Autism Observation Scale for Infants Administered Via Telehealth
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Background: Level one screening for autism is commonly completed via parent questionnaires for infants without known risk of autism (Petrocchi et al., 2020). For those with parent-report-identified elevated likelihood of autism and/or those with parent or provider concerns, level two screening using behavioral observation is often helpful to ascertain an accurate understanding of early signs of autism (Khowaja, Robins, & Adamson, 2018). The COVID-19 pandemic and other circumstances that limit access to in-person observational screening yielded a shift to the use of telehealth to provide access to those in need of level two screening. However, there is limited empirical evidence supporting the reliability and validity of level two screening via telehealth (Dahiya et al., 2020; Talbott et al., 2020).

Objectives: To examine inter-rater reliability and assessment fidelity of the Autism Observation Scale for Infants (AOSI) administered via a parent coaching telehealth format to screen for elevated likelihood of autism in a community sample of infants aged 6-16 months.

Methods: Data for this study was drawn from a larger longitudinal study examining sensory and social communication development in infants and toddlers. Participants were 28 parents and their infants ages 6-16 months with no known genetic conditions or major sensory or motor impairments. The primary measure was the Autism Observation Scale for Infants (AOSI; Bryson & Zwagenbaum, 2014), a 19-item semi-structured observational screening tool for early signs of autism in 6-18-month-olds. The AOSI was administered remotely using a parent coaching model developed from Talbott and colleagues (2020). We also applied an assessment fidelity checklist, developed for the purposes of this study, to examine the presence or absence of parent behaviors that are consistent with expected administration of each item. The total score on the assessment fidelity checklist represents the proportion of items that were administered correctly. Data analyses included calculation of mean proportions of correctly administered items, as well as intraclass correlation coefficients (ICC) and Kappa statistics as measures of inter-rater reliability.

Results: Parent-administered items were conducted with an average of 82% fidelity (SD = 6%; Range = 71-93%). The majority of items were administered correctly in at least 75% of observations. In terms of inter-rater reliability, ICC were 0.94-0.95. Kappa values ranged from 0.38-1.00 across items.

Conclusions: Based on the results of this study, telehealth parent coaching is a valid and reliable method for conducting semi-structured observational screening for autism with the AOSI. Further analysis using direct comparison between in-person and telehealth administration of this measure is needed to examine potential differences in reliability and validity based on administration context.

421.104 (Poster) Hebrew Adaptation of a Clinical Questionnaire for Preschool Children with ASD
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Background:

Speech Language Pathologists (SLP) all over the world seek efficient clinical tools that will facilitate the assessment of communication, language and early speech of preschoolers with ASD (Muller et al., 2020). The Pre-Verbal Communication Schedule (PVCS) is a well accepted clinical questionnaire that was created in England by Kiernan & Reid (1987) for the assessment of communicative skills in profoundly cognitive impaired non-verbal individuals.

The Israeli Center for the Treatment and Research of Autism, runs 300 preschools for children with ASD, all over the country. In these preschools more than 400 SLPs provide clinical services for the children and their parents.

Objectives:

The goal of the present study was to create and to validate an Hebrew modified version of the PVCS to be used in the assessment procedure of preschoolers with ASD in the Israel.

Methods:

The adaptation process of the PVCS was done in a focus discussion group of 8 SLPs experts in early communication and language acquisition and impairments, who supervise the clinical programs that are delivered in the preschools of the Israeli Center for the Treatment and Research of Autism. The questionnaire was validated via content validation process through experts judgments by 10 researchers in the area of language development and language disorders, who were not involved in the construction of the tool (Fernández-Gómez, E., et.al., 2020).

Results:

The modified Hebrew questionnaire consists of the following 7 out of the 13 original subtests in the English source: 1) Visual Behaviors, 2) Cognitive Representational Skills, 3) Communication, 4) Social Orientation, 5) Language Comprehension, 6) Vocal/Verbal Productions, 7) Augmentative/Alternative Communication. Each subtest contain items that are developmentally listed from early to late emerging attainments. Examples of typical activities of young children with ASD are provided next to each item to facilitate the process of filling in the questionnaire by the SLPs. An additional sub-test in which non-communicative behaviors are listed was also created. This subset refers to RRBI rituals characterizing ASD. The scoring sheet in which the frequency of occurrence of each item is noted allow the revealing of the comprehensive clinical profile of each child, that lead to the selection of intervention goals in the areas of communication, language and speech. In order to demonstrate how a clinical profile of a child emerges from the analysis of the questionnaire’s data, a case of one 3 years old girl with ASD will be presented (see table 1 bellow).

Conclusions:

The modified Hebrew PVCS –ASD is a new tool for depicting the clinical profile of young children with ASD. Preliminary results point to its utility for selecting targets for early intervention on the basis of the comprehensive clinical profile.

421.105 (Poster) Factors Associated with DSM-5 Severity Ratings for Black and Hispanic/Latinx Children with ASD

Background: Diagnostic and Statistical Manual of Mental Disorders (5th ed., DSM-5; APA, 2013) diagnoses of ASD require clinicians to assign severity ratings of the impact of social communication (SC) and restricted and repetitive behavior (RRB) symptoms. Ratings for each domain range from 1 (requiring support), 2 (requiring substantial support), or 3 (requiring very substantial support). A small body of research has found associations between ASD severity level ratings and standardized measures, including cognitive functioning, parent report questionnaires, and the Autism Diagnostic Observation Schedule (ADOS-2) (Mazurek et al., 2019; Ellison et al., 2019). However, racial and ethnic minority groups have not been well-represented in this literature.

Objectives: To examine associations between clinician-rated DSM-5 ASD levels of severity and norm-referenced behavioral symptom measures in a clinical sample of Black and Hispanic/Latinx children.
Results: Spearman correlations were examined between clinician DSM-5 severity ratings and assessment measures. For White Hispanic/Latinx children, SC severity was associated with ADOS-2 Social Affect (SA) severity ($r_s=.60,p<.001$), ADOS-2 Total severity ($r_s=.61,p<.001$), NVIQ ($r_s=.42,p<.001$), and ASRS SC T-score ($r_s=.42,p<.001$). A similar pattern was found for Black Non-Hispanic children: ADOS-2 SA ($r_s=.59,p<.001$), ADOS-2 Total ($r_s=.49,p<.001$), NVIQ ($r_s=.70,p<.001$), ASRS SC ($r_s=.31,n.s.$). For White Hispanic/Latinx children, RRB severity was associated with ADOS-2 RRB severity ($r_s=.49,p<.001$), ADOS-2 Total severity ($r_s=.42,p<.001$), NVIQ ($r_s=.45,p<.001$), BASC-3 Internalizing T-Score ($r_s=-.24,p<.05$) and BASC-3 Adaptive T-score ($r_s=-.28,p<.01$). A similar pattern was found for Black Non-Hispanic children, ADOS-2 RRB ($r_s=.31,n.s.$), ADOS-2 Total ($r_s=.26,n.s.$), NVIQ ($r_s=-.52,p<.01$).

Conclusions: Similar patterns of association between clinician DSM-5 severity ratings and other behavioral and cognitive measures were found for both groups, although there were fewer associations with the smaller sample of Black children. DSM-5 severity ratings in a clinical sample appear to be influenced by a variety of cognitive and behavioral factors. Implications for clinicians examining these measures in a diagnostic setting will be discussed.

421.106 (Poster) Feasibility of Adequate Data Capture for “Off-the-Shelf” Eye-Tracking Technology As a Possible Aide to Autism Diagnostic Assessment with Young Children

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Background: There is a strong international effort to identify and diagnose autism early. Diagnosis is currently based on the clinical judgement of behavioural presentation (Whitehouse, Evans, Eapen, & Wray, 2018) and while the average age of ASD diagnosis in childhood is estimated after age 4 even in well-resourced settings (Bent, Barbaro, & Dissanayake, 2015), confident diagnosis is possible and highly stable from age 2 (Barbaro & Dissanayake, 2016). Developed and manufactured by JVCKENWOOD Corporation (JKC), Gazefinder is a relatively new eye-tracking device with potential to support autism diagnosis, evidenced through existing research conducted in Japan, including with children aged 5-17 years (Tsuchiya et al., 2021) and adolescents and adults (Fujioaka et al., 2016).

Objectives: To test the feasibility/acceptability, and safety of Gazefinder ahead of potential future use as an aide to early childhood autism diagnosis, by examining whether this non-invasive, brief (approx. 2-minute), automated, standardised assessment is tolerated by, and returns adequate data for, young autistic and non-autistic children aged between 2-4 years.

Methods: 203 children completed Gazefinder eye-tracking assessment 1) 102 children with confirmed community autism diagnosis (81% male; $M_{age}=44$ months); and 2) 101 controls (57% male; $M_{age}=40$ months) screened as likely typically developing without any parent-reported concerns related to autism/other developmental conditions or autism among immediate family members. For children with autism, Gazefinder assessment occurred alongside a comprehensive clinical/behavioural assessment including the Autism Diagnostic Observation Schedule-Revised (ADOS-2), Mullen Scales of Early Learning (MSEL), and Vinelad Adaptive Behaviour Scales-2nd edition (VABS-II) while controls completed Gazefinder and VABS-II only. All assessments were completed by clinical (i.e., non-technical) researchers, who recorded: 1) number of attempts to complete Gazefinder, 2) child behaviour during eye-tracking, 3) any adverse events. Automated data collected by Gazefinder included calibration attempts/success and overall % gaze tracking rate per child.

Results: In the autism group, most children met ADOS-2 Total Algorithm ‘Autism’ classification (n=87), and MSEL composite standard scores suggested significant developmental delay for a substantial subgroup (i.e., 36% with floor-level scores) corroborated by low group mean VABS-II scores (M=74.96; SD=12.39, vs. control M=111.24; SD=13.53). All 101 controls successfully completed Gazefinder assessment, compared to 94% of children with autism. Only four children with autism could not be calibrated despite multiple attempts, and Gazefinder assessment was not attempted for two due to earlier unrelated adverse responses to behavioural assessment. Most controls (97%) and fewer autistic children (77%) calibrated on the first attempt. Autistic children who needed multiple attempts for calibration had lower MSEL Non-Verbal abilities (M=50.92, SD=7.13) than those who calibrated quickly (M=70.64, SD=21.94). Only seven controls had overall tracking rates <70%, vs. 34 autistic children. For autistic children who were successfully calibrated, lower overall tracking rate was associated with lower MSEL Non-Verbal and Verbal abilities (relative to age).
Conclusions: Gazefinder was very well-tolerated by all 101 controls and most of the 102 children with autism assessed, even in the context of significant clinical presentation identified in the latter group. We are currently also investigating, and will report on, acceptability and ease-of-use by community clinicians.

421.107 (Poster) Feasibility of Building a Streamlined Birth Cohort to Examine Biomarkers Related to Autism in a Community-Based Health System


Background: Community-based health systems with large numbers of annual births could advance autism etiologic research by enabling prospective cohorts with rich data across multiple metrics in diverse and representative populations. In particular, capitalizing on biosamples collected via routine clinical practice presents the opportunity to develop a “streamlined birth cohort” approach that minimizes participant burden but opens the potential for multi-omics work, with potential addition of follow-up measures of child behavior relevant to the autism phenotype. However, the feasibility of such an approach has not been tested. To address this gap, we piloted the implementation of a streamlined birth cohort based in a community-based health system with a large number (>7,000) of annual births.

Objectives: We examined the feasibility of building a streamlined birth cohort within a community health system across multiple indicators.

Methods: We examined the following as indicators of feasibility: (1) enrollment of at least 100 pregnant women over six months, (2) demographic representativeness of enrolled participants, (3) successful collection of biosamples, including umbilical cord blood, umbilical cord tissue, placenta tissue, and meconium (stool from babies’ first bowel movements) from enrolled participants by birth hospital staff integrated with routine clinical practice followed by transmission to a central laboratory, (4) enrollment of a subsample of 50 initially enrolled participants into a follow-up study of babies at age 6 months, with collection of (a) caregiver-reported data on child social behavior using the Socialization Subscale of the Vineland Adaptive Behavior Scales, and (b) markers of early social behaviors relevant to autism derived from Computer Vision Analysis of mobile-device-captured infant attentional engagement in response to on-screen social stimuli. Due to covid-related disruptions, subsample enrollment eligibility was extended to include babies up to 24 months of age.

Results: We were able to successfully enroll 99 women over a 6-month period. Demographic profiles (i.e., 66% White/ 25% Black/11% Hispanic) were consistent with the census data for the counties were participants lived. Biosamples were successfully collected by birth hospital staff integrated with routine clinical practice followed by transmission to a central laboratory, with 76% of eligible women contributing at least one delivery biospecimen (n=71). COVID-19 impacted recruitment timelines for the follow-up study and necessitated a shift to remote (home-based or virtual) data collection. However, we successfully enrolled 30 participants (representing 60% of phase 2 goal) who completed at least one follow-up measure. Computer Vision Analysis data from mobile-device-captured infant attentional responses to social stimuli were successfully obtained for 27 participants (90% of those enrolled in Phase 2).

Conclusions: Indicators of participation rate, demographic profiles, implementation of data collection at birth, and follow-up, suggest that it is feasible to build a representative streamlined birth cohort within community healthcare systems. The characterization of children across biological and behavioral measures relevant to the autism phenotype from birth in the context of community health system offers the potential to advance our understanding of prenatal and early emerging markers associated with autism-related phenotypes.

421.108 (Poster) Gender Differences in Dyadic Emotional Availability in Children with ASD

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Background: Females with Autism Spectrum Disorder (ASD) might present better socio-communicative abilities, though future research needs to focus on narrower constructs in order to comprehend better the mechanisms that lead females’ under-recognition (Lai & Sztatmari, 2020). Recent research showed that females present better interpersonal synchrony with greater engagement during the interplays (Paolizzi et al., 2022). Though, engagement has been investigated using only one parameter, which did not allow for fully grasp child responsiveness and involvement in the interaction.

Objectives: In the present study, we aimed to study gender differences related to the Emotional Availability construct with a specific focus on child dimensions: responsiveness and how the child involves the adult. Based on current literature, we expect females to be more responsive and more involving toward the adult compared to males.
Methods: N=67 parent-child dyads interactions, of 37 children with mothers and fathers, both when available, have been analyzed. Specifically, there are 18 males (mean chronological age=38.40 months, sd=10.50) and 19 females (mean=44.10 months, sd=11.00) with a confirmed diagnosis of ASD. The females sample size has been determined by availability constraints and the male’s one has been selected matching the females’ by general development quotient. Children received a complete clinical assessment, the cognitive profile has been assessed using the Griffith Mental Development Scales (GMDS) and the behavioral profile using the ADOS-2. Further, parent-child dyads have been requested to play as they typically would in a quiet room for 10 minutes with a standard set of toys. These interactions have been video recorded and coded by two independent observers, blind to child diagnosis and research aims, using the Emotional Availability Scales 4th Edition (Biringen, 2008).

Results: The females sample received the diagnosis significantly later than the males’ one (t(65)=2.21, p=0.03, d=0.54). Preliminary analysis showed gender differences in the child dimensions but not in the parents’ ones. Specifically, females showed higher responsiveness levels (W=750, p=0.02, r=0.30), with greater emotion regulation of affects and behaviors abilities (W=721, p=0.04, r=0.26), better positive physical positioning (W=704, p=0.04, r=0.25) and greater orientation toward the adult while playing (W=720, p=0.03, r=0.27). Gender differences also emerged in relation to involvement dimensions, in particular, females showed greater ability in the involvement of the adult in a positively elaborated interaction (W=790, p=0.003, r=0.36) and used the adult more oriented toward the emotional needs and playful exchange concerning instrumental use (W=772, p=0.003, r=0.36). Further, females presented a greater use of eye contact and nonverbal channels to involve the adult (W= 714, p=0.03, r=0.26). Analysis conducted using two-way ANOVAs studying EAS’s parameter differences including child sex and parent as factors showed no differences related to parent gender. Data will be further studied using linear models.

Conclusions: Child gender differences have been highlighted in the responsiveness and involvement, potentially disclosing mechanisms involved in the late diagnosis of females with ASD and stressing the need to investigate narrower constructs when studying gender differences in ASD phenotypes. Further, these preliminary results suggest the absence of differences in fathers’ and mothers’ Emotional Availability.

421.109 (Poster) Hazard Perception in Male Autistic Children in Jakarta: An Investigation of Their Skills and Parents' Subjective Evaluation

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Background: Children in Indonesia are vulnerable to road injuries and fatalities. Data from previous studies showed that children between 0 – 14 years old made up for almost 1/3 of all traffic fatalities in Indonesia. Within this group, children between 10-14 years old were the most represented percentage-wise. A possible reason for this overrepresentation may be children's deficiency in hazard perception (HP) skills. Previous studies suggested that these deficiencies may be more present among autistic children, making them even more vulnerable to road injuries and fatalities. Generally, parents play an essential role in educating their children about safe travel behaviors. They determine how much supervision is needed for their child throughout the developmental process of their HP skills. Since a more negative view of a child's HP skills can limit the development of HP skills (i.e., by limiting their learning opportunities), the accuracy of parents' perception of their children's skills is important. This can be even more limiting for autistic children as they generally experience more problems with HP skills.

Objectives: The objective of the current study was twofold: (1) compare the hazard perception skills of autistic and non-autistic children in Jakarta, Indonesia, and (2) investigate the autistic parents' perception of their child's HP skills and examine if there is a potential relationship between their perception and their child's performance.

Methods: Data was collected through online questionnaires. Children were presented with photos of traffic situations in Jakarta on which they had to indicate if and where a hazardous situation could occur. Hazards were divided into four categories: behavioral prediction (BP), environmental prediction, dividing and focusing attention (DF), and no hazards. Parents were asked for their opinions on their child's HP skills and predicted their child's test performance.

Results: Twenty male autistic children (ages: 10 – 15) and their mothers participated, together with 34 male non-autistic children (ages: 10 -14). Analyses showed that autistic children significantly identified fewer BP, EP, and DF hazards. They also responded slower to all types of hazards compared to the non-autistic children. No differences were found for the photos where no hazard was present. Parents could accurately predict their children's total number of correct answers on the test. However, they tended to overestimate their children's reaction time. Further analyses showed that parents whose children could identify fewer hazards and reacted slower tended to overestimate their children's HP skills. Interestingly, the more days a week children walked around in their neighborhood, the more accurate their parents' prediction was.

Conclusions: The current study offered valuable insights into the HP skills of autistic children. Results showed that autistic children significantly performed worse on the HP test, and their parents tended to overestimate their reaction time. Moreover, children with more...
exposure to hazards scored better on the test, indicating that increased exposure in a safe environment positively affected their HP skills. Future research could focus on the factors that may influence the HP skills of autistic children and/or could include females, other age groups, or children from different countries.

421.110 (Poster) Executive Functioning Predicts Age of Diagnosis in School-Aged Youth with Co-Occurring ASD and ADHD

Background:
Executive functioning (EF) is impaired in autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD), and we previously identified exacerbation of EF challenges in youth with co-occurring ASD and ADHD (ASD+ADHD). Delayed identification of ASD poses risk for social and emotional difficulties, but the impact of EF on diagnostic timing of ASD has yet to be explored.

Objectives:
This study aimed to parse EF to identify predictors of age of ASD diagnosis, particularly in late-diagnosed school-aged youth who may present with more complex EF presentations. We hypothesized 1) ASD+ADHD youth are more impaired in EF compared to autistic youth without ADHD (ASD-only) and 2) ASD+ADHD youth are at significant risk for delayed ASD diagnosis. As an exploratory aim, we investigated whether greater EF challenges predicted earlier age of ASD diagnosis in both diagnostic groups.

Methods:
Participants included 400 youth seen for neuropsychological evaluation who received an ASD diagnosis after the age of 5, drawn from a clinic-based research sample of >2500. Youth with a co-occurring ADHD diagnosis were in the ASD+ADHD group (n=297); youth without co-occurring ADHD were in the ASD-only group (n=100). Parent-reported EF was measured with the BRIEF-2. The BRIEF-2 taps nine subdomains (Inhibit, Self-Monitor, Shift, Emotional Control, Initiate, Working Memory (WM), Plan/Organize (PO), Task Monitor (TM), and Organization of Materials (OM)) that form three indices (Behavior Regulation, Emotional Regulation, Cognitive Regulation) and a Global Executive Composite score (GEC). Independent samples t-tests were used to compare EF impairment and age of ASD diagnosis between the ASD+ADHD and ASD-only groups. Pearson correlations examined the association between age of ASD diagnosis and EF for each diagnostic group. Hierarchical linear regressions further probed significant relationships to determine whether specific EF subdomains concurrently predicted age of ASD diagnosis after controlling for assigned sex at birth, FSIQ, and ASD symptom strength (SRS-2 T-scores).

Results:
ASD+ADHD youth had greater impairments in EF overall, and specifically in Inhibit, Initiate, WM, PO, TM, and OM (t’s>3.19, p’s<.01). ASD+ADHD youth received ASD diagnoses earlier than ASD-only youth. In ASD-only youth, age of ASD diagnosis was significantly correlated with PO, but no other EF subdomain. In ASD+ADHD youth, age of ASD diagnosis was significantly correlated with Initiate, WM, PO, TM, and OM. After controlling for assigned sex at birth, FSIQ, and SRS-2 T-scores, the regressions revealed PO as a significant predictor of age of ASD diagnosis in the ASD-only group, and PO, TM, and OM as significant predictors of age of ASD diagnosis in the ASD+ADHD group.

Conclusions:
Parents of youth with ASD+ADHD report greater impairment in overall EF skills, and specifically with cognitive regulation EF skills, compared to parents of youth with ASD-only. Contrary to our hypothesis, findings suggest ASD+ADHD youth are diagnosed with ASD earlier than ASD-only youth in this clinic-ascertained sample, perhaps due to higher clinical impairment. Results also suggest greater EF impairment predicts later age of ASD diagnosis, with planning/organization as the most consistent predictor.

421.111 (Poster) Age of Autism Diagnosis in Asian American Versus White Youth in a US Clinical Sample
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Background: Asian American youth are widely under-represented in autism research, so much so that in most surveillance years, the CDC has been unable to estimate a national prevalence rate of autism in this group. Little is known about diagnostic timing of autism among Asian American youth, though prior research indicates these families experience unique stressors related to the autism experience. It is
important to further explore the relationship between race and diagnostic timing of autism, and to evaluate the moderating effect of race on previously identified predictors of age of autism diagnosis (e.g., autism symptom strength and cognitive ability).

Objectives: For this study, we hypothesized 1) Asian American youth will be diagnosed later than White youth and 2) race will moderate factors predicting age of autism diagnosis, specifically parent-reported autism symptom strength and cognitive ability.

Methods: Data from a clinic-based research database was extracted for 673 participants who were seen for neuropsychological evaluation and met the following criteria: 1) first-time diagnosis of autism, 2) identified as Asian American (n=83) or White (n=590), and 3) SRS-2 data available. Full-scale IQ (FSIQ) was available for a subset (Asian American: n=42; White: n=345).

Results: On average, Asian American youth (M=7.71, SD=4.65) received their first autism diagnosis significantly earlier than White youth (M=8.76, SD=4.44), \(t(671)=-2.02, p=.044\). When the sample was split by early diagnosis (before age 6) and later diagnosis (age 6+), a Chi-squared analysis revealed a significant over-representation of White youth in the later diagnosed group, \(\chi^2(1)=5.67, p<.05\). There were no significant differences in age of autism diagnosis between Asian American and White youth in the early diagnosis group (t(228)=-1.21, \(p=.23\)) nor the later diagnosis group (t(441)=-.05, \(p=.96\)). Child Opportunity Index scores were not significantly correlated with age of autism diagnosis (\(r=.09, p=.18\)). Age of autism diagnosis was significantly correlated with autism symptom strength (\(r=.18, p<.001\)) and FSIQ (\(r=.10, p<.05\)) in the full sample, such that higher SRS-2 total T-scores and higher IQ were associated with later age of autism diagnosis. Hierarchical regressions revealed that independently, autism symptom strength and FSIQ were predictors of age of autism diagnosis, but race did not moderate these relationships (Table 1).

Conclusions: Findings suggest Asian American youth receive their first-time autism diagnosis earlier than White youth on average. However, this finding could be unique to our sample, which was drawn from individuals who were seen at a specialized autism center. Additionally, this finding should be considered in conjunction with the finding that compared to White youth, Asian American youth are less likely to receive an autism diagnosis after the early intervention period, indicating that Asian American youth with more subtle profiles may go undiagnosed. Higher levels of parent-reported autism symptom strength and higher cognitive abilities were both predictors of later age of diagnosis, but neither relationship was moderated by race. Future research is needed to identify and bring awareness to the profile of older Asian American youth who might be less recognized as having autism and/or are experiencing barriers to accessing services at a medical center.

421.112 (Poster) Adapted Clinical Interview for Autism (ACIA): Improving Episodic Memory Recall in Autistic Individuals for CBT Treatment
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Background:
High rates of anxiety and depression are reported to co-occur with autism. Cognitive behavioural therapy (CBT), an effective treatment for anxiety and depression, relies on an initial assessment interview to develop a collaborative formulation and devise a treatment plan. The client is asked to recall a recent problem episode, reflecting on their thoughts, feelings, and actions. This is likely to be especially difficult for an autistic person, as anxiety, depression and autism are all associated with episodic memory recall differences. Previous research in police interviewing has led to scaffolded interviewing techniques (e.g., the Witness Aimed First Account method, ‘WAFA’) that support differences in how autistic people remember and report events, improving recall quality.

Objectives:
To investigate an Applied Clinical Interview for Autism (ACIA) adapted from WAFA for use in CBT assessment.

Research questions:
1. Does the adapted interview (ACIA) improve recall compared to standard CBT assessment interview format (‘CBT-as-usual’)?
2. Is anxiety and depression associated with episodic recall during CBT assessment, and is this moderated by interview type?

Methods:
A 2 (Group: autistic vs. non autistic) x 2 (Interview: CBT-as-usual vs. ACIA) between-subjects design was used. Autistic (n=30) and non-autistic (n=32) adults randomly allocated to ACIA or CBT-as-usual interview recalled a negative event (via Microsoft Teams).
CBT-as-usual participants were asked to engage in uninterrupted free recall attempt of their chosen negative event, before being asked follow-up questions about the event (who, what, where, when, how) and their experience (thoughts, feelings, behaviours and sensations).

ACIA interview participants were first asked to segment their event into its constituent parts, which were displayed on virtual post-it notes on screen (Figure 1). Each segment was revisited, whereby the participant freely recalled as much as they could from the segment, followed by the same prompts used in the CBT-as-usual interviews supported by a worksheet with visual cues (see Figure 2).

Each new unit of information recalled was coded as episodic (specific to the time, e.g., feeling sick during the meeting) or semantic (non-event-specific information e.g., generally sick before meetings), and represented thought, behaviour, feeling, sensation, or event/context. Participants also completed the WASI-II and the Hospital Anxiety and Depression Scale (HADS).

Results:

There was a main effect of interview ($p<.001$, partial $\eta^2=.42$): more episodic details about the event and behaviours, thoughts, feelings, and sensations (all $ps<.005$) were recalled in ACIA interviews. There was no effect of Group or Group x Interview for episodic information ($ps>.518$) or semantic information (all $ps>.162$).

For the autistic group, interview condition moderated the relationship between HADS scores and episodic recall scores ($p=.032$, $sr^2=.15$): there was a positive relationship between episodic recall scores and HADS scores for autistic participants in the CBT-as-usual condition ($p=.017$, $sr^2=.19$), but not the ACIA condition ($p=.097$, $sr^2=.08$). No such effects were found for the non-autistic group ($p=.586$, $sr^2=.01$).

Conclusions:

The ACIA is effective in supporting recalling of past events for CBT assessment, particularly for autistic individuals with higher anxiety and depression scores. Further research to investigate use of the ACIA in practice is indicated.

421.113 (Poster) Are Autism and ADHD Traits Associated with Performance on a Cognitive Behavioural Therapy Skills Task?  
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Background: Autistic people are more likely to experience mental health problems compared to non-autistic people, with a lifetime prevalence of 42% for anxiety and 37% for depression. Adapted cognitive behavioural interventions show promise in supporting autistic people experiencing anxiety and depression. To engage effectively in CBT, an individual should have skills in identifying, distinguishing, and describing cognitions, behaviours and emotions, also referred to as CBT skills. Such abilities may be influenced by being neurodivergent, particularly having autistic or ADHD traits.

Objectives: To understand whether autism and ADHD traits impact on CBT skills task performance, and if number of co-existing neurodivergent diagnoses/identities influenced CBT skills.

Hypotheses:

1. Higher autism traits will be associated with lower CBT skills performance.
2. Higher ADHD traits will be associated with lower CBT skills performance.
3. Individuals with a higher number of co-existing neurodivergent conditions will have lower CBT skills scores.

Methods: In total, a convenience sample of 186 participants, aged 16-30-years-old, were recruited from community settings to complete an online survey (see Table 1). Participants provided demographic information including their history of diagnoses and/or self-identification with neurodivergent conditions including autism, ADHD, and other specific learning difficulties such as dyslexia.

To assess autism and ADHD traits, participants completed the AQ-10 and ASRS-V1.1 screener.

Participants then completed a novel CBT skills task. In this task, they were asked to read two 100-word vignettes with a fictional account of an individual with a mental health condition (depression and social anxiety). Participants were then asked to identify the subject’s thoughts, feelings and behaviours, to indicate whether these could be connected, and to apply this understanding to develop a plan to help reduce the subject’s distress. A higher total score indicated greater proficiency in utilising the skills required when engaging in CBT (maximum = 23). The measure had moderate internal consistency ($\alpha = .780$).
Results: We found support for the first hypothesis: a hierarchical multiple regression revealed a significant negative relationship between AQ-10 and CBT skills task scores (Table 2).

We did not find support for the hypothesis that ADHD traits would predict lower CBT skills task performance. In fact, there was a significant positive relationship between ASRS-V1.1 screener and CBT skills task scores.

We did not find support for the third hypothesis: there was no relationship between the total number of diagnosed/self-identified neurodivergent conditions and CBT skills task performance.

Conclusions: Individuals with high autistic traits may experience barriers to effectively engaging in CBT. This highlights the importance of developing appropriate autism treatment adaptations, to increase the inclusivity of CBT. However, possessing ADHD traits positively impacted on CBT skills. It may be that individuals with high ADHD traits face barriers at a later stage of CBT compared to those with autistic traits, i.e., such individuals are more likely to possess the prerequisite skills for CBT, but may struggle with attending to and implementing information learned in CBT sessions. It is recommended that future research explores the identified relationships in greater depth by using more complete measures of neurodivergence.

Background:
Gathering detailed information through clinical interview, a key aspect of Cognitive Behaviour Therapy (CBT), helps develop a formulation and treatment. Open questions and Socratic enquiry, hallmarks of CBT interviews, are less accessible for autistic people, reducing the quality and quantity of information available.

Objectives:
To investigate CBT therapists’ and adults’ views about the acceptability and utility of an adapted clinical interview.

Methods:
The Adapted Clinical Interview for Autism (ACIA) was developed following methods used in previous interviewing research (Maras et al. 2020). Sixty- two adults (n=30: Autistic, n=32: Non-autistic; 28.4% Male; 83.1% White, 5.7% Black, 11.4% Asian ethnicity) were randomly allocated to CBT-as-usual (CBT-AU) or ACIA interview. Interviews, conducted online, asked participants to recall in detail a recent episode associated with negative emotion with questions about situational triggers, thoughts, feelings, bodily sensations and behaviours (CBT-AU). In ACIA interviews, participants self-segmented their recall into chunks and recalled each in turn. Visual cues were used to prompt detail about thoughts, feelings etc. Six CBT therapists (blind to group) developed a cross-sectional formulation from 49 of the interview transcripts and rated them on acceptability and utility (14 items). Formulations were coded for percentage completeness. Interviewees also rated acceptability and utility (17 items). Open text boxes invited comments from therapists and interviewees for subsequent content analysis.

Results:
A 2 (group: Autistic vs. non-autistic) x 2 (interview: ACIA vs CBT) between subjects ANOVA found a significant main effect of interview type on therapist utility ratings, $F(1,45)=15.73, p<.001$, $\eta^p=.26$, with the ACIA rated as having significantly higher utility than CBT-AU. There was no significant main effect of diagnosis, $F(1,45)=3.05, p=.088$, $\eta^p=.06$, or interaction, $F(1,45)=1.27, p=.266$, $\eta^p=.03$.

For therapist acceptability ratings, there was a significant main effect of interview, $F(1,45)=9.42, p<.01$, $\eta^p=.17$, with the ACIA rated as significantly more acceptable than CBT-AU. There was no significant main effect of diagnosis, $F(1,45)=2.15, p=.149$, $\eta^p=.05$, and no interaction, $F(1,45)=1.29, p=.263$, $\eta^p=.03$.

All formulations were at least 80% complete. Formulation completion was not associated with interview type ($p=.211$). Content analysis of open text comments identified four themes (Table 1). All clinicians reported that ACIA format helped them develop a more precise formulation, but also highlighted concerns about the time intensive nature of the interview.
Autistic and non-autistic participants rated both interview formats as useful and acceptable (Figure 1). There were no significant effects or interactions of interview type on utility ratings (all ps>0.5) but there was a significant main effect of Group on acceptability ratings, (B=0.29, SE=0.13, 95% bootstrapped CI for B [0.01, 0.57], t(49)=2.17, p<.05), with non-autistic interviewees finding all interviews more acceptable than autistic interviewees. There was no effect of interview or group x interview interaction (all ps>0.08).

Conclusions:

An adapted clinical interview was rated as acceptable and useful by autistic and non-autistic adults and clinicians, with the latter valuing more detailed information with which to develop a formulation. Qualitative feedback suggested refinements to improve the interview which now requires evaluation in more naturalistic clinical setting.

421.115 (Poster) “You’re Simply the Best”: IQ and Baseline Vineland “Better Than All the Rest” at Predicting Adaptive Functioning Among Youth with Autism Spectrum Disorder

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Background: Standard cognitive assessments have been identified as the most robust predictor of later adaptive functioning in youth with autism spectrum disorder (ASD), but IQ may be less accessible or limited in its predictive ability for children with greater autism severity (e.g., Liss et al., 2001). Common ASD co-occurring conditions, like psychiatric issues, gastrointestinal problems, and sleep disturbance, are more accessible for families and clinicians to assess and are mostly unrelated to ASD symptom severity (e.g., Simonoff et al., 2008; Neumeyer et al., 2018). Previous literature found associations between adaptive functioning and psychological problems and physical health problems (Baghdadli et al., 2012; Hus Bal et al., 2015; Taylor et al., 2012). However, past studies have not assessed behavioral and physical health issues in comparison to previously identified predictors of adaptive functioning (e.g., IQ).

Objectives: The objective of this study is to compare the predictive strength of multiple baseline predictors (i.e., demographic information, cognitive ability, adaptive skills, behavioral health issues, and physical health issues) of adaptive skill development four years later.

Methods: A total of 565 children with ASD (ages two to 17; 80% male; average IQ of 77), who were previously enrolled in the Autism Treatment Network (ATN) Registry and follow-up, were selected for the current study. The follow-up assessment took place roughly four years after their baseline assessment. Prediction of follow-up VABS was estimated in three models using multivariable regressions. Each model groups the variables into different groups to assess how these variables function as scale scores or as larger sets of predictors. Model 1 evaluated three sets of predictors: demographics (age, race, sex, income, education, Vineland Aberrant Behavior Scale (VABS) scores, and IQ), behavioral health (ADOS scores and Child Behavior Checklist internalizing and externalizing problems scores), and physical health (gastrointestinal and constipation problems, seizures, and Child Sleep Health Questionnaire score). Model 2 treated each measure’s scale scores as predictors. Lastly, model 3 treated each individual subscale score as a variable. Semi-partial coefficients of determination (R-squared) were used to provide estimates of the amount of variance in follow-up VABS that could be independently explained in each model.

Results: A little less than half of the variance in follow-up VABS was explained by the model with all focal predictors (42.4%). Almost all the variance was accounted for by the demographic variables. Baseline VABS significantly and independently explained the largest portion of variance (13.4%, p < .001) followed by age (1.6%, p < .001) and IQ (1.5%, p < .001). Behavioral measures as a group collectively independently explained 0.5% of the variance and physical health measures independently explained 0.7% but were not significant.

Conclusions: Our findings replicate the pre-existing literature among a diverse and representative sample of children in the autism population and suggest clinicians and caregivers should seek out IQ and Vineland assessments to best assess later social and functional outcomes for children with ASD. And although our model did not find health measures to be significant predictors, these measures may still indirectly contribute to adaptive functioning outcomes.

431 - Diagnostic, Behavioral & Intellectual Assessment II

431.076 (Poster) Leveraging Eye-Tracking Biomarkers to Improve ASD Diagnostic Accuracy in the Primary Care Setting

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Background: Laboratory studies, many using prospective longitudinal designs of infants at elevated likelihood for developing autism, have demonstrated that several eye-tracking indices may be sensitive to autism risk. However, the accuracy of these novel biomarkers for the
Objectives: To determine whether a battery of eye-tracking biobehavioral markers can reliably differentiate young children with and without ASD in a high-risk community-referred sample collected during clinical evaluation the primary care setting.

Methods: Early Autism Evaluation (EAE) Hubs have been established in primary care practices across the state of Indiana. Participants included 158 children (M=2.6 years; SD=0.6; 73% male; 71% non-Latinx White) from 7 EAE Hubs. Children were diagnosed with ASD (n=112) or with a non-ASD developmental disorder (e.g., global developmental delay, language delay; n=46) based on a follow-up blinded research-grade evaluation conducted by ASD experts (including caregiver DSM-5 interview, Mullen Scales of Early Learning [MSEL], Vineland Adaptive Behavior Scales [Vineland-3], Autism Diagnostic Observation Schedule [ADOS-2]). The biomarker assessment included a short battery of eye-tracking measures (approximately 10 mins), which indexed non-social preference, attentional disengagement, basic oculo-motor dynamics, pupillary response, and blink rates using a series of flexibly administered experimental paradigms.

Results: Non-social preference (percentage looking time) was significantly higher in children with ASD (M=48%; SD=22) compared to non-ASD children (M=22%; SD = 12; \( p < 0.001 \)). Attentional disengagement, as measured using by gap-effect scores, did not differ significantly between ASD (M=148ms; SD=133) and non-ASD (M=146ms; SD=126) children. For basic oculomotor indices (i.e., fixation duration and saccade amplitude and velocity), children with ASD showed significantly longer fixation durations across two separate conditions (baseline [dynamic central fixation], animated cartoons; all \( ps < 0.005 \)). For animated cartoons, children with ASD also showed significantly reduced saccadic amplitude (\( p=0.008 \)). Measures of resting pupil diameter and spontaneous blink rates, which may index norepinephrine and dopaminergic systems, respectively, did not differ between ASD and non-ASD groups (\( p>0.05 \)).

Conclusions: Consistent with prior findings, children with ASD displayed increased non-social preference and oculomotor indices of reduced visual exploration (i.e., longer fixation durations, reduced saccade amplitude). However, contrary to previous results that compared children with ASD and neurotypical children, we did not find evidence of slower disengagement, larger pupil size, or decreased blink rates. Thus, it may be that some biomarkers may not differentiate those with and without ASD in high-risk neurodevelopmental cohorts. The present study demonstrates that eye-tracking markers of ASD risk can be successfully acquired in the primary care setting; future research will examine whether a combination of clinical and biobehavioral measures can be combined to improve accuracy of ASD diagnostic outcome for non-specialist primary care clinicians.

Background:

Underlying genetic factors influence assessed risk for later autism spectrum disorder (ASD). First-degree relatives of children with ASD are more likely to develop or present with the disorder, and there is an elevated rate of subclinical ASD characteristics in parents of children with ASD. These subclinical features, referred to as the Broad Autism Phenotype (BAP), include communication, personality, and behavioral characteristics that reflect the phenotypic expression of broader autism traits. Thus, maternal BAP characteristics may be associated with ASD symptomatology in their infant offspring and serve as one predictor of infant risk of developing the disorder.

Objectives:

To examine whether maternal self-reported BAP characteristics are associated with infant features related to ASD risk in participants from an ongoing birth cohort study.

Methods:

Maternal report data of the Broader Autism Phenotype Questionnaire (BAPQ) and the First Year Inventory Lite (FYI Lite) were collected for English and Spanish-speaking mother-infant dyads (n = 112, female = 68, male = 44) at 12-15 months of age.

The BAPQ is a 36-item Likert scale questionnaire with three subscales: Pragmatic Language, Rigidity, and Aloofness. The FYI Lite contains a subset of 25 questions from the full FYI, with social communication and sensory regulatory risk subdomains resulting in a dichotomous risk indicator.
Results:

A positive correlation ($r = 0.234, p < 0.05$; Table 1) was found between maternal self-reported Pragmatic Language ($M = 2.348, SD = 0.677$) and maternal report of infant social communication ($M = 1.718, 0.511$). A simple linear regression was performed to further evaluate this association ($R^2 = 0.046, F[1,110] = 6.385, p = 0.013$) with higher maternal pragmatic language difficulties being positively associated with FYI social communication risk ($b = 1.303, p < 0.001$; Figure 1). We explored the correlations of the following covariates: infant sex, maternal age, maternal education, race, and risk associated with having a family member with ASD in this initial set of infants; none were significant. There was a preliminary finding of difference in slope based on sex groups, but this may be explained by outliers. Data collection is ongoing, and we will continue to explore and report the impact of these covariates as appropriate.

Conclusions:

Mothers who self-reported higher levels of BAP characteristics, specifically in pragmatic language, reported higher levels of social communication risk characteristics in their infants. Given that ASD is influenced by underlying genetic risk factors, maternal phenotypic characteristics of social communication deficits might result in offspring displaying similar or more pervasive language impairment as well as ASD risk. Beyond this potential genetic link, home language environment may play a role, with altered maternal interaction with infant and other family members contributing to a cascading sequelae of environmental features that may interact with genetic predispositions to influence emerging ASD symptomatology. We note the findings are limited by lack of direct observation and reliance on maternal report. While the relationship between parental BAP traits and offspring ASD symptomatology is not fully understood, these results indicate it may be a key component in early ASD identification and intervention.

431.078 (Poster) Maternal Multiple Sclerosis and Risk of Neurodevelopmental Disorders: A Focus on Developmental Profile and Socio-Communicative Skills.


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Background: In the context of maternal pathological condition, to be aware of the possible impact of parental disorders on offspring’s developmental trajectory represents a key health issue. The cognitive-behavioral and developmental profile of children exposed to maternal Multiple Sclerosis (MS) – pharmacologically treated or not - has not been delineated in depth. Whereas most of clinical and research attention has been given to the pregnancy adverse outcome (spontaneous abortion, ectopic pregnancy, non-live birth, congenital malformation) related to the maternal condition. Starting from the literature’s limits, and given our research background on the early detection of warning signals within population at risk, we have performed the following study.

Objectives: To characterize the cognitive and behavioral phenotype of offspring of women with MS - with a specific focus on the possible increase of Autism Spectrum Disorder risk – in comparison to age matched groups: a) children of women affected by Perinatal Depression (PD); b) control group of children not exposed to maternal MS or PD during pregnancy.

Methods: Women enrollment was conducted in the context of a health safeguard project developed to support women during pregnancy and post-partum, and to early detect child warning signals of a derailed development. Here we present preliminary data on a group of 16 children of mothers with MS in comparison to 2 groups of age matched mother-child pairs: women who suffered from Perinatal Depression (PD) and a control group of women not affected by MS and PD. Offspring of each group of women (MS, PD and control) underwent, at a mean age of 41 months, a standardized neuropsychiatric evaluation of: developmental-cognitive and adaptive skills (Griffith-III Scale, Adaptive Behavior Assessment System II), behavioral problems (Child Behavior Checklist), autism symptoms (Autism Diagnostic Observation Schedule–Second Edition) and parental stress (Parental Stress Index Short Form). Women belonging to MS and PD group received pharmacological therapy during pregnancy according to their clinical condition (Figure).

Results: Preliminary results on a sample of 48 children (16 individuals for each group) homogeneous for age $p = 0.73$, revealed that there are no statistically significant differences in terms of cognitive/developmental issues ($p = 0.17$), adaptive skills ($p = 0.19$), level of autism symptoms (ADOS-2 Calibrated Severity Score $p = 0.72$), social skills (ABAS_SAD $p = 0.44$) and behavioral problems (CBCL Internalizing Symptoms $p = 0.81$, Externalizing $p = 0.65$, Total $p = 0.09$) (Figure). Finally, the level of parental stress measured during child evaluation did not differ among groups (Total $\chi^2 = 2.0; p = 0.368$).

Conclusions: Our results on a limited sample size, even if don’t permit to lead to conclusions, suggest that maternal Multiple Sclerosis does not significantly impair child developmental profile, socio-communicative skills and behavioral phenotype. We depict a preliminary picture - through the administration of standardized instruments - of cognitive and behavioral profile of children of women affected by Multiple Sclerosis which absolutely need to be confirmed on wider samples taking into consideration maternal confounding factors (ie.
comorbid psychiatric disorders and symptoms, habits during pregnancy including smoking and exposure to maternal pharmacological treatment).

**431.079 (Poster) Measuring Intolerance of Uncertainty: Factor Structure and Measurement Invariance of the IUS-12 with Autistic and Non-Autistic Adults.**

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**Background:** Intolerance of uncertainty (IU) is the belief that uncertainty is negative and to be avoided. It is an important transdiagnostic construct implicated in a range of anxiety conditions, and a recent meta-analysis indicates that this may also be true for autistic people. However, there is yet not yet a validated tool for measuring IU for autistic adults. The IUS-12 is a widely used tool for measuring IU in the general population and is the most frequently used to assess IU in studies with autistic people. It is vital that we have psychometrically robust measures of IU for research and clinical practice, particularly given the recent development of promising interventions targeting IU with autistic people (e.g., Coping with Uncertainty in Everyday Situations [CUES]).

**Objectives:** This study aimed to assess the factor structure and measurement invariance of the IUS-12 with autistic and non-autistic adults.

**Methods:** Archival data from 1326 non-autistic adults (mean age 39.5; 25.4% male) and 526 autistic adults (mean age 41.6; 42.4% male) were analysed. Data from autistic adults were available from the Adult Autism Spectrum Cohort – UK (ASC-UK) for a study about anxiety; data from non-autistic adults available through opportunity sampling. To conduct exploratory (EFA) and confirmatory (CFA) factor analysis on separate groups, each dataset was randomly split into two subgroups, stratified by age and gender. IUS-12 total scores were significantly higher for autistic people (median = 45) than non-autistic people (median = 25); however, there was no significant difference in IUS-12 scores between the subgroups from the autistic person dataset nor the subgroups for the non-autistic dataset. Several factor models were tested based on theoretical considerations and empirically tested, including a single factor, two correlated factors and a bi-factor model. Measurement invariance between autistic and non-autistic groups was also assessed.

**Results:** In both autistic and non-autistic groups, the theoretical bi-factor model including a general IU factor and two group factors relating to the traditional subscales of the IUS-12 (Prospective Anxiety and Inhibitive Anxiety) represented the greatest model-fit, more so than the empirically derived bi-factor models resulting from EFA. In each case, there was a strong general IU factor but weaker support for the group factors, indicating that the total score should be considered the most accurate indicator of IU. Measurement invariance was not supported between the groups.

**Conclusions:** Although the total score is reliable, the IUS-12 may measure different constructs in autistic compared to non-autistic people therefore comparisons of scores between these groups is not advised. Future research should attempt to assess why the IUS-12 may not be invariant by, for example, investigating the interpretation of items by autistic people and exploring conceptual differences in autistic people’s experience of IU. This could inform adaptations to improve the tool for autistic adults (e.g., changing wording; adding/removing items) and may lead to the development of a more theoretically driven factor structure that more accurately represents the overall construct. This would lead to a more psychometrically robust measure of IU for autistic people with potential utility as an outcome measure.

**431.080 (Poster) Meta-Analysis of the Modified Checklist for Autism in Toddlers, Revised/Follow-up for Screening for Autism Spectrum Disorder.**

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**Background:** The Modified Checklist for Autism in Toddlers, Revised with Follow-Up (M-CHAT-R/F) is one of the most widely used screening instrument for autism spectrum disorder (ASD) worldwide. It is applied both to well low-risk and high-risk children and has been translated and employed in multiple languages.

**Objectives:** To calculate the psychometric properties of the M-CHAT-R/F questionnaire in English and other languages for subsequent diagnosis of ASD using meta-analysis.
Naturalistic Observation Diagnostic Assessment-Enhanced (NODA-E) Telehealth Vs. in Person Assessment for Early Autism Spectrum Disorder (ASD) Diagnosis

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Background: Diagnosis of Autism Spectrum Disorder (autism) is possible before 2 years of age; however, age of diagnosis is still lagging between 4.0-5.7 years of age. Telehealth systems have been designed for treatment, and a few have been designed to facilitate initial autism diagnosis (e.g., TELE-ASD-PEDS; NODA; CanvasDx). The Naturalistic Observation Diagnostic Assessment - Enhanced version (NODA-E) expands upon NODA’s asynchronous platform to include e-referrals, imported screeners, additional 3rd-party assessments, and a new synchronous real-time telehealth tool enabling “live-tagging” of child behaviors.

Objectives: Our objective was to compare agreement between results of NODA-E and an in-person assessment (IPA) on presence of DSM-5-TR diagnostic criteria, severity of autism diagnostic criteria, and final diagnosis of autism. It was hypothesized that the NODA-E assessment results would be comparable to the IPA.

Methods: Fifty families with children aged 16-33 months were recruited from a university autism assessment clinic following a moderate to high-risk screen administered by a pediatrician or the university clinic. Following consent, families were randomly assigned to one of two assessment teams and clinicians within the team were randomly assigned to either NODA-E or IPA. Assessment order was also randomly assigned. NODA-E provided the parent(s) with a smartphone app interface with instructions to complete assessments and record different scenarios with the child. The clinician reviewed and tagged video segments and conducted a telehealth interview with families. The IPA was the full gold standard assessment conducted at the clinic. After completion of both assessment protocols, clinicians compared diagnostic criteria endorsed, diagnostic severity endorsed, and final diagnosis of autism. Due to NODA-E variable data being constant for most DSM-5-TR criteria (i.e., always marked as present), percent agreements are reported and Kappas are provided where calculations were possible.

Results: Thus far, 26 families have completed NODA-E and IPA assessments. Agreement for the 3 autism social communication and social interaction (SCI) diagnostic criteria was near perfect (A1 = 96%; A2 = 96%; A3 = 96%, respectively). Overall agreement for SCI severity ratings were fair (Kappa = .360, p = .017). Agreement for the 4 restricted interests and repetitive behaviors (RRBs) diagnostic criteria were also near perfect (B1 = 96%; B2 = 96%, Kappa = .283, p = .143; B3 = 96%, Kappa = -.017, p = .925; and B4 = 96%, Kappa = -.040, p = .838, respectively) and overall agreement for RRB severity ratings were high (96%, Kappa = .237, p = .086). Agreement for final diagnosis of autism was near perfect (96%).

Conclusions: Preliminary results indicate that use of the smartphone app NODA-E to document the presence and severity of autism symptoms and make a diagnosis of autism is comparable to an IPA. These findings suggest that use of synchronous telehealth techniques have promise for autism assessment and diagnosis. Advantages of this model are increased access to diagnostic services and possibly...
decreased wait time for those services. Some challenges may be reliance on/access to a smartphone and time needed to capture and upload videos for clinician review.

**431.082 (Poster) Naturalistic, Non-Invasive Method for Capturing Biometric Data during Autism Diagnostic Evaluations**


**Background:**

Computational approaches are emerging as promising, objective methods to capture the complex and granular repertoire of behaviors associated with Autism spectrum disorder (ASD). However, developed for exclusive contexts, most tools are limited to specific environments and modalities and require participants to wear devices or restrict their movement by remaining front-facing to the camera. The work presented here focuses on a model of computer vision and machine learning analyses with the capacity to capture and quantify domains of social, language, and early motor behaviors within administration of the Autism Diagnostic Observation Schedule-Second Edition (ADOS-2).

**Objectives:**

(1) Demonstrate technical validity by analyzing and appraising how our non-invasive methods detect and monitor social-communication behaviors within standard clinical contexts.

(2) Establish the clinical association and validity between biometrics captured through these computational AI-based methods and their targeted clinical conditions.

**Methods:**

We recruited 60 participants, 13 Non-ASD (Age mean=6.4, SD=±2.4 years, % Female= 53.8%) and 47 with a history of ASD or neurodevelopmental conditions with suspected ASD (Age mean=8.5 SD=±2.9 years, % Female= 40.4%) from June 2017 to August 2019. Participants received standard diagnostic evaluations including the ADOS-2 (Modules 1, 2, 3) and cognitive assessment (Mullen, WISC, WASI-II, Stanford Binet, or DAS-Early Years). In addition, demographics, NIH medical history, and ACE family medical history were collected. ADOS-2 footage was recorded using off-the-shelf 2D cameras and Tobii Pro Glasses 2 worn only by the examiner during the session. Captured footage was analyzed using computational Artificial Intelligence (AI) methods, with a focus on capturing a specific subset of visual and auditory domains corroborated by clinicians. Our AI-based analysis pipeline captured 283 biometrics including gaze, facial expressions, speech paralinguistics and affect, and gait features (Figure 1).

**Results:**

Biometrics for analysis were selected previously based on test-retest reliability (Brune et al, 2022) and content validity. Preliminary analysis on a subset of 24 age-matched ASD and Non-ASD participants suggests that ASD participants demonstrated shorter speech duration and fewer occurrences of reciprocal conversation and hand contact engagement than Non-ASD participants. Our metrics provide a continuous, quantitative variable for these domains (Table 1).

**Conclusions:**

Our results showed a variety of nuanced key biometric social markers differed by group across domains including gaze, gestures, social communication skills, speech, and sentiment. The relevant analytical validity of the captured biometrics is further established through the production of high-quality and reliable data during dynamic contextual environments. The clinical utility of our results was also demonstrated by assessing differences in such quantified biometrics between participants with and without ASD. Further analysis on additional biometric domains is ongoing and includes responsive gaze, initiations across joint attention tasks, and conversational exchange between groups. These findings demonstrate the predictive power and potential for a dynamic, non-invasive computational approach to analyzing social communication behaviors during standard-clinical evaluations. Future directions include evaluating applicability in phenotyping and treatment outcomes in clinical and research settings.

**431.083 (Poster) Neuropsychological Characteristics in Individuals with Anorexia Nervosa and High Autism Spectrum Traits**

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Background: Anorexia nervosa (AN) is associated with neuropsychological difficulties, such as challenges in complex emotion recognition, set-shifting and central coherence. These difficulties may contribute to the length and severity of AN but are also common in autism spectrum disorder (ASD), which appears to be overrepresented among individuals with AN. However, the proportion of individuals with AN suffering from these neuropsychological difficulties is unclear. In addition, it is unknown whether they are a part of the neuropsychological profile of AN or merely reflect underlying ASD in a subpopulation of individuals with AN.

Objectives: We aimed to examine challenges in complex emotion recognition, set-shifting and central coherence among individuals with AN and high versus low ASD traits versus healthy controls (HCs) with low ASD traits. We also aimed to assess whether neuropsychological characteristics predict low body mass index (BMI), other eating disorder symptoms, and duration of AN.

Methods: Participants (18–30 y) included 18 women with AN and high ASD traits, 24 women with AN and low ASD traits, and 38 HC women with low ASD traits. Complex emotion recognition was assessed with face photographs. Set shifting was assessed with the Berg’s card sorting test and central coherence with the Fragment picture task. ASD traits were assessed with a self-reported questionnaire.

Results: Individuals with AN with high ASD traits performed poorer in tasks measuring complex emotion recognition, set-shifting, and central coherence when compared to HCs (p = 0.002, p = 0.014, p = 0.001, respectively). In addition, individuals with AN with high ASD traits also performed poorer in tasks measuring set-shifting and central coherence than individuals with AN + low ASD traits (p = 0.048, p = 0.035, respectively). There were no significant group differences between individuals with AN with low ASD traits and HCs. Difficulties in complex emotion recognition predicted increased duration of AN only in individuals with AN with high ASD traits (R² = 0.296, p = 0.036).

Conclusions: Neuropsychological difficulties appear to be present specifically in a subgroup of individuals with AN and high ASD traits. Among this subgroup, challenges in complex emotion recognition may contribute to the prolongation of AN.

431.085 (Poster) Parents and Teachers’ Perspectives on Autism and Co-Morbidity Symptom Severity of Young Autistic Children over One Academic Year

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Background:

It is a well-accepted practice to collect information from multiple sources when conducting medical and developmental assessments of autistic children. However, most studies assessed parent and teacher perceptions at only one point during the academic year. The few longitudinal studies in the literature examined parent–teacher reports, focused only on perception of autism severity, yielding conflicting results. The current study seeks to extend the existing research to include not only the contribution of parent/teacher perceptions of autism severity among young autistic children across time but also their perception of ADHD and anxiety co-morbidities.

Objectives:

- To compare parents and teachers’ ratings of autism, ADHD, and anxiety symptom severity of autistic children attending special education classes both at the start (T1) and the end (T2) of the school year.
- To assess changes in parent and teacher reports on the above domains, separately, from T1 to T2.
- To examine correlations between parent and teacher reports at T1 and T2 in the examined measures.

Methods:

The study included 73 participants (M=61) aged 2:10-7:6 years (M =4:10, SD=1:0) diagnosed with autism, who possessed different levels of functioning, were attending special education classes, and were receiving intensive intervention. At two timepoints, parents and teachers completed different measures: for autism severity, the Social Responsiveness Scale (SRS); for ADHD, the Conners’ Rating Scales; and for anxiety, the Spence Children’s Anxiety Scale (SCAS).

Results:
For SRS scores, a 2x2 (Rater x 2 Times) MANOVA with repeated measures for time revealed a significant Time effect \([F(2,53)=3.34, p=.04, \eta^2=.11]\) and a significant Time X Rater Interaction \([F(2,53)=5.69, p=.006, \eta^2=.18]\). When examining SRS subdomains, only social-communication and interaction (SCI) scores showed a significant Time X Rater interaction \([F(1,54)=9.83, p=.003, \eta^2=.15]\). At T1, teachers evaluated significantly more severe SCI deficits than parents \([F(1,64)=9.14, p=.004, \eta^2=.12]\). However, only teachers reported less severe SCI subdomain symptom scores after one academic year \([F(1,69)=9.91, p=.005, \eta^2=.14]\). Regarding ADHD, a 2X2 MANOVA with repeated measures for Time revealed a significant interaction only on the Conners Inattention subdomain \([F(1,43)=5.15, p=.03, \eta^2=.11]\). Only at T1 teachers rated Inattention subdomain scores higher than parents, \([F(1,64)=9.15, p=.004, \eta^2=.12]\). A decrease in teachers’ Inattention scores was noted at T2 \([F(1,56)=13.94, p<.001, \eta^2=.20]\). Regarding anxiety, a 2X2 MANOVA with repeated measures for Time revealed a significant Rater effect \([F(1,56)=10.79, p=.002, \eta^2=.16]\), but not a Time effect nor a significant Time X Rater interaction. Parents rated total SCAS scores higher than teachers. Significant correlations between parents and teachers’ reports were noted for autism severity at T1 and T2.

Conclusions:

At start of the academic year teachers described more severe social-communication impairments and inattention symptoms than parents, but significant improvement in teachers’ ratings was noted at year’s end. At both timepoints, parents reported more elevated anxiety symptoms than teachers. The study emphasizes the contribution of multiple perspectives for better collaboration between home and school environments. Obtaining accurate information from parents and teachers at start of the school year may help identify factors needed for better adjustment at school and better addressing of difficulties at home.

431.086 (Poster) Participation in Standardized Academic Assessments and Academic Achievement of Children with Autism and Neurodevelopmental Disorders in Ontario, Canada

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Background: Developmental skills associated with Autism Spectrum Disorder (ASD) and those with other neurodevelopmental disorders (NDD) contribute to elementary school-age children’s difficulties in achievement of age-appropriate reading, writing, and math academic skills. This knowledge is largely based on clinical assessments, as there is a wide assumption that children with ASD and NDD are usually exempt from completing the routine standardized educational assessments, suggesting that existing assessments are not inclusive for students with a neurodiversity.

Objectives: In this study, we explore the impact of a childhood diagnosis of ASD or NDD on first, the likelihood of children completing standardized assessments, and second, their academic achievement on those assessments, in the context of social and health characteristics.

Methods: In a quantitative longitudinal study design, we linked data on children’s development in kindergarten from 2010 to 2012 in Ontario publicly funded schools, collected using the Early Development Instrument (EDI), to standardized provincial assessments in grades 3 (years 2013-2015) and 6 (years 2016-2018). Information on children’s diagnoses was recorded on the EDI in kindergarten. Sociodemographic variables came from kindergarten data and included: sex, English/French Language Learners (EFLL), special needs, poor early development, and existence of functional impairment. The main outcome was first, participation in the assessment, and second, meeting provincial expectations in Grade 3/6, i.e., passing above a threshold score in reading, writing, and mathematics. We used cross tabulation (Pearson Chi-Square 2-sided test) and binary logistic regression analysis using SPSS.

Results: Among 121,967 children, 1,256 had ASD and 1,520 had NDD. There were greater proportions of males and children with Grade 3 or 6 Individual Education Plan (IEP) among the children with ASD than NDD, and the reverse was true for percentage of children with EFLL (p<0.001). We found that 63%-81% children with ASD and 68%-80% with NDD were either exempt from or did not participate in the assessments (i.e., had no scores available, Table 1). Logistic regressions showed that children with NDD were about 1.5 times (odds ratio range 1.436-1.542, p=0.012-0.037) more likely to participate in assessments than those with ASD. Having an IEP, EFLL, or poor early development was associated with decreased likelihood of participation. Among those who participated, there was no difference between the two groups in the likelihood of meeting provincial expectations.

Conclusions: The results of our study indicate that provincially mandated standardized educational assessments were designed with typically developing children in mind only, as they did not appear to be inclusive, since more than 60% of children with ASD or NDD did not participate in them. Being a student with ASD or NDD did not change the likelihood of meeting standardized test expectations. Our study suggests that implementing a more effective, inclusive methodology to monitor academic progress for children with ASD and NDD to ensure that their abilities are both measured and measured in an equitable manner. Understanding the patterns of school-age achievement for children with ASD and NDD – something that is currently lacking at a population level - is critical to facilitating inclusive education.

431.087 (Poster) Phenotypic Profiles of Children Diagnosed with ASD after Being Identified By a School-Based Universal Screening Questionnaire

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Background: Despite research suggesting that autism spectrum disorder (ASD) can be reliably diagnosed by the second year of life, the average age of diagnosis remains between 4-5 years. Many individuals are not identified as having ASD until adolescence or adulthood (Li et al., 2022), which suggests that symptoms of ASD at younger ages are missed/overlooked/misdiagnosed. This is especially true for children exhibiting more subtle symptoms, where functional impairments may not emerge until school-age or later. Identifying ASD before functional difficulties become clinically significant is important for mitigating potential adverse outcomes like social rejection and vocational challenges. Further, because services for adolescents/adults are limited relative to children, earlier identification could lead to improved functional outcomes. Our team recently implemented a school-based universal screening program to identify undiagnosed children with ASD that was both feasible and acceptable (James & Smith, 2022). Examination of phenotypic profiles of children identified through school-based universal screenings and subsequently diagnosed with ASD may provide insight into nuanced ASD presentations, which can help inform earlier identification.

Objectives: To examine phenotypic profiles of children diagnosed with ASD after being identified by school-based universal screenings.

Methods: Over four years (2019-2022), teachers from 13 charter schools in Phoenix, Arizona completed 4,672 screenings using the Social Challenges Screening Questionnaire (SCSQ) (Smith et al., 2015). Of the completed screenings, 183 scored in the concern range, and parents of 66 students agreed to be contacted about receiving a free follow-up diagnostic evaluation. Of the 66 families who agreed to be contacted, parents of 29 students declined evaluations. Formal diagnostic evaluations were conducted with the remaining 37 students by licensed psychologists. Evaluations included diagnostic history interviews, Autism Diagnostic Observation Schedule, Second Edition (Gotham et al., 2007; Lord et al., 2009; 2012), Kaufman Brief Intelligence Test, Second Edition (Kaufman & Kaufman, 2006), and Vineland Adaptive Behavior Scales, Third Edition (Sparrow et al., 2016). Of the students evaluated, 81% (n=30) met full diagnostic criteria for ASD. Phenotypic profiles of these 30 children were examined in this study (see Table 1 for descriptive statistics).

Results: While the sample IQ was average (m=112), overall adaptive functioning (m=86) was significantly lower relative to intelligence (t(29)=8.67, p<.001), and approximately one standard deviation below the normative mean. Domain scores indicated the greatest impairment relative to intelligence was in Socialization (t(29)=9.66, p<.001), followed by Communication (t(29)=7.33, p<.001), then Daily Living Skills (t(29)=5.86, p<.001).

Conclusions: Students in the current study had statistically and clinically significant adaptive impairments. Yet, compared to findings from comparable samples of school-age children/adolescents without intellectual disability (Klin et al., 2007; Matthews et al., 2015), students in the current study had substantially higher adaptive functioning scores, most notably for Daily Living Skills. This could indicate that universal screening at school-age helped identify children with ASD before more significant adaptive impairments emerged who may have otherwise gone undiagnosed until adolescence or adulthood. More research using matched samples is needed to better understand the extent to which children identified through screening may differ to children who are evaluated because of parent concern.

431.088 (Poster) Predicting Autism Spectrum Disorders in Infant Siblings Using Machine Learning Classifiers Built with 12-Month Data
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Background: Growing access to sophisticated computational technology in research and healthcare settings has facilitated the use of powerful computer science techniques, including machine learning. Though becoming more common in clinical and research fields, research into autism spectrum disorder (ASD) has yet to fully leverage this technology. To date, Bussu et al. (2018) is the only study to have generated supervised machine learning classifiers using Autism Observation Scale for Infants (AOSI) data.

Objectives: (1) Generation of supervised machine learning classifiers using 12-month AOSI and Mullen Scales of Early Learning (MSEL) data in a cohort of infant siblings (n=373), and (2) assessment of classifier performance at predicting 36-month ASD diagnosis in infant siblings from two Canadian longitudinal studies (n=92; n=90).

Methods: Supervised machine learning classifiers using logistic regression (with and without regularization) and support vector machines using linear, polynomial, and radial basis function kernels were generated in R/Studio using combinations of participant biological sex, 12-month MSEL standard scores (Visual Reception, Receptive Language, Expressive Language, Fine Motor, and Early Learning Composite), and 12-month AOSI item-level and Total Score data. Factor analysis (informed by principal axis parallel analysis) was used as a means of reducing item-level AOSI data dimensionality during machine learning modelling to mitigate model overfitting. Classifiers were assessed by their ability to predict 36-month ASD diagnosis in subsets of infant siblings (n=92; n=90) from two Canadian longitudinal cohorts.

Results: Machine learning classifiers had fair performance. The best-performing classifiers across all algorithm types were between 76-77% accurate and had areas under the curve (AUC) between 0.73 and 0.76. Specificity of these classifiers was excellent (0.94-1.0), but they showed extremely poor sensitivity (0-0.19). Relative to the performance of a 12-month AOSI Total Score cut point of 7 (informed by Youden index assessment; AUC = 0.66, sensitivity = 0.52, specificity = 0.74) at predicting 36-month ASD diagnosis, machine learning
classifiers had enhanced AUC and specificity, but significantly decreased sensitivity. The best-performing classifiers in this study yielded higher accuracy, AUC, and specificity (but not sensitivity) relative to the best performing classifier generated by Bussu et al. (2018) using 14-month data (accuracy = 64%, AUC = 0.71, sensitivity = 0.61, specificity = 0.67) and similar machine learning methodology.

**Conclusions:** Though the best-performing classifiers in this study performed below levels recommended for early screening, accuracy, AUC, and specificity were moderately improved relative to those generated by Bussu et al. (2018) using 14-month AOSI data. Further exploration into feature selection, extraction, or inclusion of 12-month AOSI and MSEL data may allow continued refinement of machine learning models built using 12-month clinical data and capable of predicting ASD at 36-months.

**431.089 (Poster) Predicting Discrepancies in Broader Autism Phenotype Ratings of Parents from the Simons Simplex Collection**

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**Background:**

Studies with simplex families indicate ratings of parent broader autism phenotype (BAP) traits can differ by sex and BAP measure (Davidson et al., 2014). Findings from the Simons Simplex Collection (SSC) also indicate some BAP trait differences for race and ethnicity, which vary by the measure and informant (Ramsey & Walton, INSAR 2019). Understanding what influences discrepancies in ratings of BAP traits of parents can help assess the utility of different BAP measures and informants across different race/ethnicity groups or in different contexts.

**Objectives:**

This study explores predictors of BAP rating discrepancies between self-reports on the Broader Autism Phenotype Questionnaire (BAPQ) and other parent ratings on the Social Responsiveness Scale (SRS).

**Methods:**

Hierarchical linear regression models (HLMs) were conducted to analyze predictors of discrepancies between BAPQ self-reports and SRS other parent ratings. The sample included 2,476 mothers (77.2% Non-Hispanic/Latinx White, 3.5% Hispanic/Latinx White, 4.1% Black, 5.1% Asian) and 2,513 fathers (78.4% Non-Hispanic/Latinx White, 3.4% Hispanic/Latinx White, 4.9% Black, 4.4% Asian) from the SSC. Separate HLMs were performed for the Non-Hispanic/Latinx White, Hispanic/Latinx White, Black, and Asian parent groups. Residualized difference scores for the BAPQ and SRS were included as a continuous outcome variable in a two-level random intercepts model. Individual level-1 predictors included sex, age, and education. Level-2 predictors included parent dyad race concordance, marital status, and annual household income.

**Results:**

Race discordance did not significantly predict residualized difference scores for parents of any race/ethnicity group. Marital status emerged as a significant predictor for Asian ($\gamma=-17.56, t=-2.13, p=.03$), Hispanic/Latinx White ($\gamma=-15.50, t=-2.64, p=.009$), and Non-Hispanic/Latinx White ($\gamma=-11.46, t=-9.97, p<.001$) parents. Married parents had smaller residualized difference scores than unmarried parents. No significant predictors emerged for Black parents. Sex, parent age, and annual household income emerged as significant predictors of residualized difference scores for Non-Hispanic/Latinx White parents, such that mothers, older parents, and lower income parents had greater discrepancies between BAPQ and SRS ratings ($p$’s<.05, Cohen’s $d$ -0.16 to 0.36).

**Conclusions:**

Significant predictors of BAP rating discrepancies emerged, which varied by race/ethnicity group. Marital status was a significant predictor for all race/ethnicity groups, except Black parents. For unmarried parents, other parent BAP ratings may diverge from self-reports due to informant biases or fewer opportunities to observe the other parent. Sex, age, and income predicted discrepancies for Non-Hispanic/Latinx White parents, which may indicate these BAP measures are more sensitive for this group. There were few racially discordant couples in the SSC sample, which may have impacted our ability to detect this as a significant predictor. This research helps inform best practices for estimating BAP traits in individuals. Davidson et al. (2014) proposed averaging BAP ratings to provide a best estimate; however, aggregating scores may introduce more noise if informant biases exist. Future research should examine race concordance, language concordance, and cross-cultural factors that may impact BAP rating agreement. Understanding informant biases may help identify which BAP measures are appropriate for different groups or contexts. This has implications for research on the prevalence and genetic transmission of autistic traits in diverse populations.
Background: Younger siblings of autistic individuals are at elevated likelihood (EL) of receiving an autism spectrum disorder (ASD) diagnosis. Compared to the general population prevalence of ~1–2% (Maenner et al., 2020), approximately 20% of EL siblings receive an ASD diagnosis (Ozonoff et al., 2011), and another 28% exhibit subthreshold features (Ozonoff et al., 2014), suggesting a substantial genetic contribution to autism. Girault et al. (2020) demonstrated that older sibling autism traits predict younger sibling diagnostic outcomes at 24 months but did not identify trait associations in sibling pairs. We aimed to replicate these findings and explore associations between sibling traits—both at and before 24 months—using additional autism screeners and assessments.

Objectives: Explore associations between older sibling autism traits and younger sibling traits/outcomes at and before 24 months.

Methods: We assessed whether older sibling (proband) scores on the Social Communication Questionnaire (SCQ) \(M_{age}(SD) = 7.2(3.4)\) years predicted younger sibling diagnostic outcomes, scores on the Autism Diagnostic Observation Schedule, Second Edition (ADOS), and scores on the Mullen Scales of Early Learning (MSEL) at the 24-month visit \(N = 42\) sibling pairs. Logistic regression was used in the outcome analysis, and linear regressions evaluated the predictive ability of proband SCQ scores for younger sibling ADOS and MSEL scores. Linear regressions were also used to assess whether proband scores on the Social Responsiveness Scale, Second Edition (SRS) predicted younger sibling scores at 9, 12, and 18 months on the Early Screening for Autism and Communication Disorders (ESAC) \(N = 34\) pairs, the Systematic Observation of Red Flags (SORF) \(N = 33\) pairs, and the Communication and Symbolic Behaviors Scales – Developmental Profile (CSBS) \(N = 39\) pairs (proband \(M_{age}(SD) = 5.5(2.5)\) years).

Results: Proband SCQ scores predicted younger sibling scores on the MSEL expressive language subscale \(\beta = - .312; p = .044\), even after controlling for age and sex of both siblings \(\beta = - .344; p = .037\). Proband SCQ did not predict younger sibling outcome \(p > .176\) or autism traits as indexed by ADOS scores \(p > .239\). Proband SRS total t-scores predicted younger sibling ESAC total scores \(\beta = .440; p = .009\) and CSBS speech domain scores at 9 months \(\beta = -.418; p = .008\) but not 12 or 18 months \(p > .090\). SRS scores did not predict SORF total scores, CSBS social scores, or CSBS symbolic scores at any time points \(p > .106\).

Conclusions: Preliminary results support Girault et al.’s (2020) finding that proband autism traits predict younger sibling expressive language. Their remaining analyses were not replicated in our sample, which may be due to differences in sample size and characteristics. Immediate next steps include expanding sample size to better understand the relevance of older sibling profiles in guiding early identification and intervention for younger siblings. Further, we found that autism traits predicted younger sibling scores on the ESAC and CSBS at 9 months but not 12 or 18 months, suggesting that the genetic contribution to autism traits may vary over developmental time, which would inform optimal windows for intervention.

431.091 (Poster) Predictive Validity of the ADOS-2 Toddler Module at Age 2 for Diagnostic Outcome at Age 3 to 4 in a Swedish Sample

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Background: The Autism Diagnostic Observation Schedule (ADOS-2) is considered a “gold standard” diagnostic instrument in the assessment of autism. There are few validation studies of the Toddler module (ADOS-T) in non-English speaking populations.

Objectives: We evaluated the validity of ADOS-2 toddler module in Swedish high vs low autism likelihood samples at age 2 to predict autism diagnosis and other outcomes at age 3 to 4.

Methods: Toddlers, aged 23 - 27 months, \(N = 147\) at familial high likelihood (HL) of autism and/or ADHD and toddlers without familial likelihood (LL) participating in the “Early Autism in Sweden” (EASE) study were assessed with the ADOS-T, and followed up diagnostically at age 35 - 48 months applying a best clinical estimate process. Diagnostic outcomes were defined as a) ASD according to DSM-5, b) ASD broader phenotype (ASD BROAD), c) provisional diagnosis of ADHD and/or language disorder (P-ADHD), and d) non clinical (NC). In the analysis, ASD was considered the target outcome in cases with co-occurring outcomes (Table 1). First, multivariate and univariate ANOVAs were conducted to investigate differences in ADOS-T algorithm scores associated between groups of high vs low autism likelihood status, age and gender. Then, we computed a multinomial logistic regression with ADOS-T item scores at age 2 as independent variables and diagnostic outcome at age 3 to 4 as independent variables. Finally, a discriminant analysis was conducted to investigate the classification accuracy of a model created from the items in ADOS-T to predict outcome at follow up.

Results: The HL sample scored significantly higher than the LL sample multivariately for ADOS-T algorithm scores \(\eta^2 = .083, p = .002\) and univariately for social affect \(\eta^2 = .032, p = .031\) and repetitive behavior subscales \(\eta^2 = .075, p = .001\). Seventeen (out of a total of 41)
Background: Symptoms of autism spectrum disorder (ASD) are typically noticeable within the first 3 years of life (Ozonoff & Iosif, 2019). Instruments for early detection and diagnosis of ASD are critical, as these will promote better clinical outcomes (Dawson, 2008; Shresta et al., 2019). The Toddler Autism Symptom Inventory (TASI; Coulter et al., 2021) is an instrument designed to assess behaviors consistent with autism symptoms in toddlers through parent report, showing adequate diagnostic predictive value among English-speakers. However, there is limited knowledge about its predictive value among Spanish-speaking children. Due to the significant challenges in the diagnosis of ASD in Latino children (Fountain et al., 2011; Valicenti-McDermott et al., 2012), the effectiveness of diagnostic instruments in Spanish-speaking Latino populations is paramount for accurate early identification.

Objectives: To examine the relationship between the Spanish version of the TASI and ADOS-2 scores and to assess preliminary predictive value of the TASI in a Latino sample of autistic children.

Methods: This exploratory study is part of a broader project examining the predictive value of autism screeners in Latino children. Participants were recruited from local ASD parent support group organizations, and consisted of 16 Spanish-speaking child-parent dyads ($n_{\text{total}}=16$), with an average child’s age of 39 months (SD=10.78). Participants completed the Spanish version of the TASI and the ADOS-2 with bilingual examiners. Descriptive and bivariate correlation analyses were conducted to examine the relationship between the Spanish TASI and the ADOS-2 scores.

Results: The mean ADOS-2 calibrated severity score was 5.57 (SD=2.98). The mean total score for the TASI was 19.38 (SD=8.20). The mean score for the Social Affect (SA) and the Restricted and Repetitive Behaviors (RRB) domains from the ADOS-2 were 12.94 (SD=7.23) and 3 (SD=2.98), respectively. As for the TASI, the mean score for ASD Criterion A of the DSM-5 was 10.94 (SD=6.11) and 8.31 (SD=3.73) for Criterion B. Results indicated that there was a moderate positive correlation between the calibrated severity scores of the ADOS-2 and total score of the Spanish TASI, r(16) = .629, p = .01. Additionally, there was a strong positive correlation between the SA domain from the ADOS-2 and the Criterion A section from the Spanish TASI, r(16) = .704, p = .002. There was no significant relationship between the RRB domain from the ADOS-2 and the Criterion B section from the TASI.

Conclusions: Preliminary data from this study suggests that the Spanish TASI may be a useful instrument in the identification of ASD among Latino children. Having reliable instruments that can accurately elicit endorsement of symptoms of ASD from parents of children under age 3 is critical. However, it is imperative to have clinically valid instruments that are equally sensitive to linguistic and culturally diverse populations. Furthermore, establishing psychometric properties of instruments in Spanish, freely available to the community, such as the TASI, can help decrease ASD diagnostic barriers in underserved communities.

431.093 (Poster) Predictors of Diagnostic Delay in Children with Neurodevelopmental Conditions

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Background: For children with neurodevelopmental conditions, early developmental assessment is crucial for implementing effective support and intervention practices. There has been limited research about factors contributing to delays in public developmental assessment clinics for vulnerable families. It is critical to examine predictors of diagnostic delays in patients attending publicly funded assessment services, where children are likely to have multiple concerns, and families have limited access to supports. Such knowledge can advance both policy and intervention practices to improve outcomes.
Objectives: This study examined factors that contributed to an (a) older age of the child when caregivers first became concerned about their child’s development and an (b) older age of the child at the point of entry into a multi-disciplinary developmental and diagnostic assessment. We also aimed to quantify how factors contributed to risk of children not receiving an assessment by 5 years.

Methods: This cross-sectional study collected information about caregiver developmental concerns, family history and child characteristics. Participants were 880 consecutively enrolled children aged 6 months to 17 years with neurodevelopmental concerns, and their caregivers. Participants were attending a large, publicly funded hospital-based pediatric developmental assessment service. A developmental history questionnaire was completed by primary caregivers of all participants.

Results: The average age that caregivers identified developmental concerns was 3.0 years of age but the average age of a receiving a developmental diagnostic assessment was 6.5 years. Only 47% of children received a diagnostic assessment by five years of age, even though 88% of caregivers were concerned about their child’s development by that age. Parental age, relationship status, education level, prior use of support services, and being from a culturally and linguistically diverse background contributed to age at identification of concern, age at diagnostic assessment and the likelihood of receiving a diagnostic assessment by five years. To illustrate, children whose parents were separated were twice as likely not to receive a diagnosis by the age of 5 years.

Conclusions: The study shows a substantial delay in diagnostic assessments that leaves most vulnerable children without an assessment by school age and highlights contributors to delays. A number of modifiable risk factors can be targeted through education and intervention programs. These delays highlight the complexity of delivering early intervention and support policies that rely on swift and appropriate developmental assessment to vulnerable families.

431.094 (Poster) Professionals’ Perspectives on Strengths-Based Autism Diagnostic Assessment
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Background: Autism diagnostic assessment tends to focus on deficits and be based on observations of behaviour which are compared to non-autistic ‘norms’. This approach is challenged by the neurodiversity paradigm, which emphasizes the importance of centering autistic voices and understanding autism holistically in terms of differences, difficulties, and strengths. Understanding how professionals can apply a neurodiversity-informed perspective to autism diagnostic assessment has the potential to improve the way diagnostic assessments are carried out. Thinking about assessment in terms a ‘strengths-based approach’, which shares similarities with the neurodiversity paradigm, could be beneficial in this respect. Accordingly, we conducted an interview-based study aimed to understand the perspectives of professionals involved in a multidisciplinary team on strengths-based autism diagnostic assessment.

Objectives: What are the perspectives of professionals working as part of a multidisciplinary autism team on strengths-based autism diagnostic assessment?

Methods: This pre-registered, qualitative study focuses on autism diagnostic assessment for children and young people (up to age 19). Autistic adults and parents/carers of autistic children were consulted about the interview schedule. Interviews were conducted with 19 professionals from a range of clinical backgrounds, and focused on professionals’ views on what a strengths-based assessment could involve and its benefits and limitations. Interviews will be analysed using reflexive thematic analysis to identify themes.

Results: N/A

Conclusions: This study will provide insight into professionals’ views on strengths-based autism diagnostic assessment. This may have implications for areas to focus on for future research. In practice, the findings may inform how professionals could conduct autism diagnostic assessment in a more neurodiversity-informed way. This has the potential to improve diagnostic assessment in ways that support autistic people to flourish.

431.095 (Poster) Psychometric Properties of the Brief Problem Monitor (BPM) 6-18 in a Sample of Children from a Neurodevelopmental Disorder Clinic

Background: The Child Behavior Checklist 6-18 (CBCL/6-18) is a widely used caregiver-report instrument for identifying emotional and behavioral problems, which is commonly applied in studies of children with autism spectrum disorder (ASD). While the CBCL/6-18 has been shown to have good psychometric properties in both typically developing children and children on the autism spectrum, it has over 100 items and can be time consuming to complete for already overloaded families. The Brief Problem Monitor 6-18 (BPM-P) was developed using item response theory analyses to identify the 19 most robust items. The BPM-P includes three subscales (attention,
Race Predicts Diagnosis of Co-Occurring Intellectual Disability in Autism

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Background: Prior research has demonstrated that race is associated with diagnosis of intellectual disability (ID), such that higher rates of ID and lower rates of ASD are reported in predominantly Black (Howard et al., 2020) and Latinx (Palmer et al., 2011) communities. Within autism, there is evidence that co-occurring ID is more often diagnosed in Black and Latinx than in White children (Becerra et al., 2014; Jarquin et al., 2011), but most research has focused on diagnostic substitution of ID for ASD.

Objectives: The aim of this study was to evaluate demographic (race, socioeconomic status) and clinical predictors (FSIQ, adaptive behavior) of diagnosis of co-occurring ID among a sample of Black, Latinx, and White youth with ASD.

Methods: A sample of 231 children ages 6-18 years (mean=11.25y, SD=3.50y; 75.3% male) was drawn from a clinical research registry at an ASD specialty clinic. All individuals had item-level data and total raw scores, and a subset of 117 had t-scores available on both the BPM-P and the CBCL/6-18. Confirmatory factor analysis (CFA) was performed to test the three-factor structure of the BPM-P. Cronbach’s alpha was calculated for the full set of items from the BPM-P as well as the three subscales to examine internal consistency. Pearson’s correlation coefficients between the BPM-P and CBCL/6-18 raw and t-scores were calculated. All analyses were performed using R version 4.1.3.

Results: The three-factor structure (including Internalizing, Externalizing, and Attention factors) of the BPM-P showed adequate fit: the comparative fit index (CFI) was 0.96, and the root mean square error of approximation (RMSEA) was 0.08. All the items showed sufficient factor loadings (larger than 0.3) on respective factors (Table 1). Cronbach’s Alpha for the BPM-P was above 0.80 for the full item set as well as the Internalizing and Externalizing scales, and 0.77 for the Attention scale, indicating acceptable to good internal consistency for both the subscales and the full scale. Correlations between the BPM-P and the CBCL/6-18 raw and t-scores were above 0.80 for all scales.

Conclusions: The BPM-P presents a similar three-factor structure in this ASD referral sample to that found in a general population sample. The BPM-P also shows good internal consistency and high correlations with the CBCL/6-18 in a sample of children from an ASD specialty clinic. Thus, the BPM-P has potential utility for substantially reducing burden in measurement of behavior problems among children with ASD. We plan to further explore the clinical utility of the BPM-P by examining the screening agreement for clinical range concerns between the BPM-P and the CBCL/6-18, as well as demographic (age, gender) and phenotypic (IQ, language levels) factors associated with higher or lower agreement.

431.096 (Poster) Race Predicts Diagnosis of Co-Occurring Intellectual Disability in Autism

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In a subsequent confirmatory diagnostic review, 2 additional blinded clinicians independently reviewed all available assessment measures that differentiate ASD from non-ASD outcomes.

Objectives: This project aims to: 1. Understand the role of family and provider race, culture, and relationships as potential barriers during the ASD diagnostic process, 2. Examine associations between barriers and timely, accurate ASD diagnosis, and 3. Assess a wider range of BIPOC youth than has been previously studied.

Results: On average, time to ASD diagnosis was 5.16 months (SD=6.78 months) and 83.5% of parents reported an accurate initial diagnosis. 70% of parents reported the diagnostic provider did not share their same race/ethnicity, and of those, 50% indicated that the process would have been improved if they had shared the same race. Shared race was not associated with a timelier diagnosis, t (88) = 1.41, p = .08, however, it was significantly associated with accurate diagnosis, χ²(1) = 4.58, p = .032: children who initially received an inaccurate diagnosis were more likely to have not shared race (92% vs. 8%). The most frequently reported barriers were (see Table 1): Difficulty understanding the medical system, Appointments were uncomfortable for my child, Evaluations were expensive, and Difficulty trusting the provider. Structural barriers did not differ by race, F(3, 99) = 3.46, SD=.65, which did not differ by race, F(3, 99) = .99, p = .93. Greater provider family-centeredness was associated with parents’ perceptions of fewer structural barriers, and greater provider understanding of parents’ cultural beliefs and language, but not timely diagnosis (see Table 2). Hierarchical multiple and logistic regression models revealed that neither family-centered nor structural barriers predicted timeliness nor accuracy of diagnosis and this did not vary by race.

Conclusions: Although shared race with diagnostic providers was important to families, it did not play a significant role in perceived barriers or timely diagnosis. It was significantly associated with accurate diagnosis. Shared race may lead to better detection of potential racial nuances in symptom presentation or lessened bias in symptom interpretation. Although our findings indicated that structural barriers and family-provider relationships were not associated with timely or accurate diagnosis, they may contribute to parents’ feelings of stress and being unsupported during an already stressful time. Data collection is ongoing and analyses will be reconducted on the full dataset.

Background: Significant disparities exist in accurate and timely autism spectrum disorder (ASD) diagnoses for Black, Indigenous, Persons of Color (BIPOC) children in the US. Research has focused primarily on structural/logistical barriers to ASD diagnosis and targeted predominantly Latinx families. Little research has examined barriers such as family race, culture, family-provider relationships, or whether barriers differ amongst other ethnic groups.

Objectives: Determine RRs for ASD in a more recent sample of EL younger siblings (enrolled between 2012 and 2020) and identify assessment measures that differentiate ASD from non-ASD outcomes.

Methods: 100 BIPOC parents of a child with ASD (M child age = 6.36 years, SD= 2.82 years) participated in our national online survey. Parents completed the Oregon English/Spanish ASD Survey (OESAS) assessing structural barriers, and The Family Centered Care Assessment (FCCA) assessing degree providers offered a family-centered approach, through respectful, culturally-sensitive, family–provider partnerships. Parents reported on family demographics, length of time to and accuracy of ASD diagnosis.

Results: On average, time to ASD diagnosis was 5.16 months (SD=6.78 months) and 83.5% of parents reported an accurate initial diagnosis. 70% of parents reported the diagnostic provider did not share their same race/ethnicity, and of those, 50% indicated that the process would have been improved if they had shared the same race. Shared race was not associated with a timelier diagnosis, t (88) = 1.41, p = .08, however, it was significantly associated with accurate diagnosis, χ²(1) = 4.58, p = .032: children who initially received an inaccurate diagnosis were more likely to have not shared race (92% vs. 8%). The most frequently reported barriers were (see Table 1): Difficulty understanding the medical system, Appointments were uncomfortable for my child, Evaluations were expensive, and Difficulty trusting the provider. Structural barriers did not differ by race, F(3, 99) = 3.46, SD=.65, which did not differ by race, F(3, 99) = .99, p = .93. Greater provider family-centeredness was associated with parents’ perceptions of fewer structural barriers, and greater provider understanding of parents’ cultural beliefs and language, but not timely diagnosis (see Table 2). Hierarchical multiple and logistic regression models revealed that neither family-centered nor structural barriers predicted timeliness nor accuracy of diagnosis and this did not vary by race.

Conclusions: Although shared race with diagnostic providers was important to families, it did not play a significant role in perceived barriers or timely diagnosis. It was significantly associated with accurate diagnosis. Shared race may lead to better detection of potential racial nuances in symptom presentation or lessened bias in symptom interpretation. Although our findings indicated that structural barriers and family-provider relationships were not associated with timely or accurate diagnosis, they may contribute to parents’ feelings of stress and being unsupported during an already stressful time. Data collection is ongoing and analyses will be reconducted on the full dataset.
information to arrive at a diagnosis. RRs were first calculated using the latest CBE available and again using diagnoses obtained from the diagnostic review process. To determine which assessment measures most strongly predicted outcomes, binary logistic regressions including ADOS-2 sub-scores (social affect [SA] and restricted and repetitive behaviors [RRB]) and MSEL sub-scales (visual reception [VR], fine motor [FM], receptive language [RL] and expressive language [EL]) were performed.

**Results:** Using CBE data, the RR of ASD within our sample was 40.00%. A total of 25.00% of the sample was classified as broader autism phenotype, 5.00% as non-ASD developmental delays, and 30.00% as unaffected. The RR of ASD was 48.75% when using diagnoses obtained from the diagnostic review process. Driving factors behind this increased RR will be investigated further. In examining between-group differences, the model using ADOS-2 sub-scores scores was statistically significant ($X^2(4)=97.732, p<.001$). RRB sub-score and total score were independently significantly predictive of CBE ($p=.049$, .043) and most strongly differentiated ASD from non-ASD CBEs. The model with cognitive MSEL sub-scales was also statistically significant ($X^2(6)=29.011, p<.001$), though EL was the only sub-scale that independently differentiated between ASD and non-ASD CBEs ($p=.018$).

**Conclusions:** From 2012 to 2022, CDC estimates of ASD prevalence increased from one in 69 (Christensen et al., 2012) to one in 44 (Maenner et al., 2021). As our understanding of what constitutes ASD has broadened, we hypothesized that RRs would increase to encompass atypical development not previously classified as ASD. While our RR of 40.00% is notably higher than previous literature, it parallels the heightened prevalence and increasing inclusivity and awareness of autism that has consistently occurred over time. Our findings underscore the criticality of developmental monitoring and surveillance of EL younger siblings and provide areas for caregivers and providers of EL children to pay increased attention to during early development.

431.099 (Poster) Reliability Metrics on the ADOS-2: Findings from GAIN
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**Background:**

The Autism Diagnostic Observation Schedule-Second edition ([ADOS-2]; Lord et al. 2012) has established a global reputation as a “gold-standard” tool utilized in diagnostic assessments for autism spectrum disorder (ASD). This complex tool requires substantial cost, practice, proficiency, and fidelity. Few individuals have access or resources to support ongoing practice and calibration with ADOS-2 experts. Global Autism Interactive Network (GAIN) seeks to fill this gap by establishing a network of clinically- and research-trained practitioners to strengthen and refine their skills in support of ongoing mastery of this tool over a digital platform that allows them to join from around the world.

**Objectives:**

We compared ADOS-2 reliability between clinically trained and research-reliable GAIN participants and determined the most and least reliable individual items.

**Methods:**

Participants met monthly from 2019 to 2021 and represented various professions and levels of training. Each participant independently watched an ADOS-2 module and submitted codes via REDCap database (Module 1: $n = 670$; Module 2: $n = 401$; Module 3: $n = 593$; Module 4: $n = 230$; Toddler Module: $n = 309$). During the monthly meeting, experts discussed consensus codes.

**Results:**

Across all modules, the agreement was significantly higher for research-reliable participants compared to clinically trained participants (see Table 1). Algorithm item-level analyses thus far revealed that on Modules 1, 2, 3, and 4 Eye Contact had the greatest reliability ($n = 670$, $M = 94.46\%$; $n = 401$, $M = 81.00\%$; $n = 593$, $M = 73.82\%$; $n = 230$, $M = 76.86\%$), respectively. The most reliable code on the Toddler Module was Response to Name ($n = 309$, $M = 98.28\%$). The least reliable item for Module 1 was Spontaneous Initiation of Joint Attention ($M = 33.88\%$), while Descriptive, Conventional, Instrumental, or Informative Gestures had the lowest reliability on Module 2 ($M = 38.00\%$). The least reliable items were Hand and Finger and Other Complex Mannerisms in Module 3 ($M = 45.10\%$) and Quality of Social Response in Module 4 ($M = 37.99\%$). Finally, the least reliable item for Toddler Module was Unusual Eye Contact ($M = 15.52\%$).

**Conclusions:**

In conclusion, research-reliable coders performed better than clinically trained participants, which demonstrates that the increased training level needed to attain research reliability translates into greater accuracy. These findings suggest the need for consistent practice, consensus coding, and discussions to strengthen reliability. In addition, findings shed light on common coding challenges and provide areas to target
in future ADOS-2 training. Potentially, programs to improve fidelity, such as GAIN, suggest that clinicians and researchers may continue to sharpen ADOS-2 skills and boost overall autism acumen.

431.100 (Poster) Late Diagnosis of Autism Spectrum Disorder - What Do We Lose in the Meantime?  
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Background:
Autism spectrum disorders constitute a heterogeneous group of disorders with a diverse clinical presentation. Additionally, the literature describes significant differences in symptomatology between females and males. For this reason, ASD diagnosis is a major challenge for clinicians and sometimes obtaining an appropriate diagnosis is delayed. As a consequence, in the case of many people on the autism spectrum, the introduction of appropriate therapeutic and rehabilitation interventions is significantly postponed. Due to this reason, there is a significant number of adolescents who are admitted to the psychiatric inpatient care with various symptoms, such as suicidal tendencies, hallucinations or aggression, who are diagnosed with an autism spectrum disorder in the course of treatment of comorbid mental disorders.

Objectives:
The aim of the study was to analyze the factors influencing the age of diagnosis and the time needed to make it from the first visit to the diagnostician.

Methods:
Data analyzed in the study was extracted from the medical records of patients admitted to one of the biggest child and adolescent psychiatry wards in Poland. The sample consists of 211 patients with diagnosis of autism spectrum disorder, 54% (\(n=114\)) of which were boys. The statistical analysis was made using StatSoft Statistica v. 13.0.

Results:
The median age of diagnosis was 12.48 (SD±3.78). Over the half of participants presented elevated risk of suicidal tendencies. At the admission, 40% (\(n=81\)) were in mood decline and 27.5% (\(n=58\)) were aggressive. Delusions were present in 34% (\(n=70\)) of patients, and hallucinations in 23% (\(n=47\)) of them. Both hallucinations (p<0.001) and mood decline (p<0.001) appeared more often in girls. The authors also reviewed the literature concerning time and age of diagnosis in various countries in Europe and the United States.

Conclusions:
Despite the constant improvement of the available diagnostic criteria and a lot of attention devoted to the training of future diagnosticians, the process of clinical evaluation of people on the autism spectrum leaves much to be desired. Meanwhile, postponing the diagnosis significantly increases the risk of other mental disorders, which is visible, for example, in the female population where the problem of underdiagnosis is particularly common.

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Background: Children with autism spectrum disorder (ASD) are described as having deficits of social interaction, communication and restricted repetitive behavioral patterns. The Childhood Autism Rating Scale™, Second Edition (CARS2) was designed to measure the symptom severity of children with ASD and is one of the most widely used assessment tools used for this purpose. The CARS2 can provide a profile of a child’s autistic symptom severity and effectively discriminate among children with mild, moderate, and severe ASD symptoms. The Chinese version of the CARS2 (CARS2-C) has been developed, and its psychometric properties need to be verified.

Objectives: This study aimed to investigate the reliability and validity of the CARS2-C, including the internal consistency and convergent validity.

Methods: Children with ASD aged from 3 to 12 years were recruited in this study. The CARS2-C includes two versions: the standard (CARS2-C-ST) and high function (CARS2-C-HF) versions. All participating children were assessed with the CARS2-C-ST, and
participants whose IQs were higher than 80 were additionally assessed with the CARS2-C-HF. To collect data on their social behaviors, their caregivers were asked to complete the socialization domain of the Vineland Adaptive Behavior (VABS) and Social Responsiveness Scale, Second Edition (SRS-2). Cronbach's \( \alpha \) and Pearson's correlation coefficients were respectively used to examine the internal consistency and convergent validity of the two versions of the CARS2-C with the VABS and SRS-2.

Results: A total of 98 ASD children participated in this study (82 boys; age range: 36–125 month), and 48 of them were additionally assessed with the CARS2-C-HF (39 boys, age range: 60–125 months). Both versions of the CARS2-C showed good internal consistency (CARS2-C-ST: Cronbach’s \( \alpha = 0.856 \); CARS2-C-HF: Cronbach’s \( \alpha = 0.834 \)). The results showed that both versions of the CARS2-C had good convergent validity with the socialization domain of the VABS (CARS2-C-ST, \( r = -0.740 \); CARS2-C-HF, \( r = -0.754 \), all \( p < .05 \)). Moreover, both versions of the CARS2-C were also significantly associated with the SRS-2 (CARS2-C-ST, \( r = 0.723 \); CARS2-C-HF, \( r = 0.767 \), all \( p < 0.05 \)).

Conclusions: Our results provide psychometric evidence on the CARS2-C. The CARS2-C has good internal consistency and convergent validity in measuring the symptom severity of children with ASD. These findings suggest that the CARS2-C is a reliable and valid assessment for measuring symptom severity in children with ASD in Taiwan.

431.102 (Poster) A Rasch Analysis of the M-CHAT-R/F Questionnaire in a Community Sample

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Background: The modified Checklist for Autism in Toddlers-Revised, with Follow-Up questionnaire (MCHAT-R/F) is a 20-item scale designed to facilitate early identification of autism in low-risk populations. Despite its widespread use, its psychometric integrity has not been comprehensively investigated in community samples.

Objectives: This study was performed to examine the measurement properties of the MCHAT-R/F using Rasch Analysis.

Methods: Rasch analysis was undertaken on MCHAT-R/F data derived from a community sample of 1355 children (670 girls, 685 boys) with an average age of 21.4 (SD: 2.5) months (range: 17-42) using the WINSTEPS software. Analyses was performed on the full 20 items. Tests were conducted to evaluate the overall model fit, suitability of response options, unidimensionality, targeting, and item fit.

Results: Several properties of the scale were deemed satisfactory. The response options performed adequately well, and the scale met the criterion of unidimensionality. The item separation index (10.7) and reliability (0.9) were observed to be very high, suggesting that the items could precisely discriminate ten levels of difficulty. However, person separation (0.1) and reliability (0.01) were very low, and the scale demonstrated poor targeting, indicating a mismatch between item difficulty and respondent’s abilities. Out of the twenty items, five were also identified as misfits.

Conclusions: The Rasch model showed that the 20-item MCHAT-R/F could be reduced to a 15-item instrument as this will potentially make the scale more efficient in measuring autistic traits in community infants and toddlers. Further, the present findings highlight that the inclusion of 5 misfit items in the current measure may have unintended practical consequences (e.g., misidentification). Though the MCHAT showed promise in discriminating between ability levels, the poor targeting demonstrated that it may not be effective or particularly granular in a general population or community sample.

431.103 (Poster) School & Autism – Development of a Diagnostic Tool to Assess Individual Barriers in Inclusive School in a Participatory Research Group


Background:
A learning environment fitted for each individual’s needs is the key to inclusion, especially when it comes to autistic students. Since the introduction of UN-CRPD inclusive education must be realized by schools, by providing “reasonable accommodation” (Art.24), thus focusing on the 4 A’s: availability, accessibility, acceptability and adaptability (Riedel 2010; Sauter 2013). This highlights the need to recognize individual barriers as a first step to remove them and provide equity in education.

We will present the research-project schAUT which is based in a neurodiverse understanding of autism (Walker 2014, 2015). Accordingly, autism is recognized as an altered (sensory) perception of the environment, resulting in an increased level of arousal (Marco, et al. 2011; Perrykka and Hohwy 2020), that might make autists more vulnerable to sensory and social barriers. It is thus imperative to assess individual barriers, especially for school aged children if we want to provide an inclusive environment. The aim of the project is to develop a tool to identify subjective barriers.

The project is organized as participatory research (Farin-Glattacker et al. 2014) jointly carried by Humboldt-University Berlin, Goethe-University Frankfurt and White Unicorn e.V., an association for self-advocacy of autistic people in scientific contexts.
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Objectives:
The main objective of the project is to develop a diagnostic instrument to assess individual barriers of autistic students in the form of a questionnaire for elementary and secondary schools, which can be filled out by students themselves to measure their sensitivity to possible barriers.

Methods:
Based on 27 Barriers, identified by White Unicorn e.V. (2016), we first conducted an open-questions online survey to find examples for each barrier in schools (n=700). For each barrier, the four most common examples were transformed into items for a second quantitative pre-test with students (n=366; av. age: 14.5). Data from this survey were used for item selection based on factor analysis, taking item-selectivity and difficulty into account. Finally, the 50 selected items were once again reviewed in a third pretest (n=618, av. age: 13).

Based on these pretests, we developed a questionnaire consisting of 50 items, testing 25 Barriers, which is currently tested in a two-phase validation setting in 19 schools (n=1094). The second phase is currently executed.

Results:
The final version of the questionnaire showed very good reliability (Cronbach α = 0.96; corrected split half-reliability = 0.97). Throughout the tests, we saw a significantly higher barrier risk for autistic in comparison to non- or maybe-autistic participants.

Further results from the current second testing phase, including statements about test-retest reliability, will be presented during the talk.

Conclusions:
As schools are required to identify individual barriers, our questionnaire can help improve inclusive education for autistic students. Our tool is thus a contribution to supporting the goals stated in UN-CRPD and might be a way to introduce new solutions for interventions, by changing the environment and making it appropriate to each individual’s needs. Ultimately, everyone - not only autistic students - will benefit from this.

431.104 (Poster) Sex Differences in the Phenotype of Children with Autism Spectrum Disorders of Known Genetic Aetiology

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Background:
Overall, ASD is less commonly diagnosed in girls than boys (1:3), but there have been consistent reports over many years that the sex ratio tends toward equality in children with moderate to severe intellectual disability (ID), and that observation is linked to the finding that pathogenic genetic anomalies are relatively more common among girls with ASD than boys. To date, no study has addressed the question, are the phenotypes of non-autistic symptomatology (e.g., adaptive function, co-occurring conditions) similar or different in girls with ID-associated ASD compared with boys of equivalent intellectual disability?

Objectives:
We aimed to identify the range and severity of ASD symptomatology and co-occurring psychopathology in boys and girls with ASD of genetic aetiology. They had been identified in the course of the IMAGINE-ID study, a national investigation of children with genetic anomalies that had been identified by the UK National Health Service, which were associated with intellectual disability (ID), and all had been identified with pathogenic CNV or SNV. For comparison purposes, we undertook an equivalent analysis of sex differences in terms of common co-occurring symptom clusters (e.g., ADHD, anxiety) in a sample of children with ID of genetic aetiology that was not associated with ASD traits.

Methods:
Measures included the Development and Wellbeing Assessment (DAWBA), the Strengths and Difficulties Questionnaire (SDQ) and the Adaptive Behavior Assessment Scales (ABAS). The DAWBA is a comprehensive online interview, which has been used in national UK surveys of children’s mental health. In addition, an Index of Multiple Deprivation (IMD) was obtained from postcode data.

Results:
Data were obtained on 776 participants with ASD (4 to 19 years; M=9.1, SD=3.9), (36.1% female) and 1410 participants with ID that was not associated with ASD traits (48.2% female). Among those with ASD, there were no significant sex differences on the ABAS general adaptive composite score (p=.8) or on parental estimates of mental age (p=.8). Girls with ASD were significantly more likely to have emotional difficulties (p<.001) and better prosocial abilities (p=.03) than boys. There were no sex differences on conduct or hyperactivity problems by sex. Among those with ID who lacked autistic traits, there were significant sex differences in emotional difficulties and prosocial abilities, as well as significant differences in hyperactivity and conduct problems. Sex differences in emotional difficulties and

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prosocial ability in children with ASD remained unchanged when tested by multiple linear regression models using chronological and developmental age as co-variates.

Conclusions:

There are sex differences in terms of co-occurring conditions between males and females with ASD of genetic aetiology in terms of emotional dysregulation and prosocial behavior, both of which are significantly greater in girls. These sex differences are not exclusively found in those with ASD but can also be observed among children with equivalent degrees of ID that is not associated with ASD traits.

431.105 (Poster) Should Implicit Bias be Studied in Differential Diagnosis of ASD in Specialized Centers?

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Background: There is ample evidence for racial and ethnic disparities in access to early assessment of ASD (Mandell et al., 2009, for review). African American and Latino children are more likely to experience increased barriers to accessing care and delays in diagnosis. Such disparities typically lead to underdiagnosing ASD. However, it is unclear how disparities may present in specialized assessment rooms – once families have surmounted barriers to accessing services.

This study asks whether implicit bias can influence diagnostic determinations of minority children by clinicians. Implicit bias occurs when unconscious associations lead to negative evaluations based on irrelevant characteristics. Healthcare professionals are just as likely to be influenced by implicit biases as the general population, and such biases can influence diagnostic decisions (FitzGerald & Hurst, 2017). Providers working with autistics are more likely to associate positive words with typical development and negative words with ASD—which could mirror implicit biases towards minority children (Barnes-Holmes et al., 2006). Implicit biases are complex to assess and remain understudied in the context of ASD assessments.

Objectives: This study explores whether implicit bias is a factor in diagnostic determinations in specialized centers. We examined differences between Expert Clinician Diagnosis (ECD) of ASD and an objective eye-tracking-based ASD diagnostic classifier.

Methods: Secondary analyses were performed on demographic and diagnostic data for 475 16-30-month-old children enrolled in a multisite, prospective, double-blind clinical trial (NCT03469986) investigating the utility of an eye-tracking-based device for the diagnosis of ASD relative to current best-practice ECD.

Eye-tracking and clinical procedures were conducted independently. Clinical procedures included standardized assessments, parent questionnaires, and other measures which led to an ECD. Eye-tracking quantified the moment-by-moment visual scanning of social scenes relative to age-expected normative data–demonstrating hundreds of data-driven convergences of group attention to scene elements at the same moments and divergences thereof in autistic toddlers.

We compared the proportion of ECD diagnoses of ASD to the eye-tracking-based device assignment of an ASD diagnosis by race and ethnicity.

Results: Chi-squared analyses revealed statistically significant differences in diagnoses of ASD through ECD by race($p=0.0476$) and ethnicity($p<0.001$). In contrast, chi-squared analyses revealed no statistically significant differences in the assignment of an ASD via eye-tracking based on race($p=0.827$) and ethnicity($p=0.210$). While African American and Latino children were diagnosed with ASD more frequently by ECD, this bias was absent in results via the eye-tracking diagnostic classifier (Table 1).

Conclusions: The ECD of ASD is complex and influenced by numerous factors. These results show differences in the differential diagnosis of ASD by race and ethnicity between ECD and objective eye-tracking-based methods. While this study was not designed to probe whether or not implicit bias plays a role in ECD assignments, results suggest that biases based on demographic factors exist. Interestingly, the bias observed in ECD was toward a higher prevalence rate of ASD in minority children relative to the objective eye-tracking method. It is possible that the field may have overcorrected for underdiagnoses and may have shifted towards over-diagnosing ASD in minority children. Future studies should further probe these possibilities.

431.106 (Poster) Spanish Cultural Adaptation of the Autism Spectrum Quotient, Child Version (AQ-Child)

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Background: The autism spectrum condition (ASC) is a lifelong, heterogeneous neurodevelopmental condition characterized by difficulties in social communication and stereotyped patterns of behaviors and interests. Considering that ASC prevalence has increased in the last three decades, research is now also focusing on studying the Broader Autism Phenotype (BAP), which refers to mild manifestations of autistic-like behaviors present in the general population. Therefore, it is important to have effective screening tools to detect ASC and the BAP in the general population. The Autism Spectrum Quotient, Child version (AQ-Child) is a 50-item parent-report questionnaire developed to assess autistic traits in children 4 to 11 years of age. This tool was designed as a parent-report questionnaire. The scores in the AQ-Child range from 0 to 150, where higher scores correspond to behaviors more characteristic of autism.

Objectives: The aim of this study was to translate and culturally adapt the AQ-Child to Spanish to use it as part of a school-based screening program in Salamanca, Castille and Leon, Spain.

Methods: The AQ-Child was translated following the guidelines of the World Health Organization (WHO), pilot tested, and then administered online through the Qualtrics platform of the Universidad de Salamanca to a school-population sample (n = 624).

Results: A total of 56 cases screened positive on the AQ-Child, Spanish version (AQ-Child-SV). From the assessed children, 33 were identified with autism spectrum condition, 4 were identified with the broader autism phenotype, and 24 with other neurodevelopmental disorders or non-ASC. For the Spanish version of the AQ-Child sensitivity was .71 and specificity .96. Positive and negative predictive values were .54 and .98 respectively.

Conclusions: The data indicates that the Spanish version of the AQ-Child appears to be a reliable instrument to screen ASC and the BAP in school-age children. Using the Spanish version of the AQ-Child in the Spanish education system may improve the identification of ASC-related behaviors in children aged 4 to 11 years, who may have gone unidentified by early detection programs and could be at a greater risk of suffering social exclusion and academic failure due to their behavioral difficulties.
sensitivity was 31% and 37% for Withdrawn scale and 23% and 30% for the DSM-PDP scale; Positive Predictive Value ranged 88% -100% and Negative Predictive Value 63%-70% for both Withdrawn and DSM-PDP scales in HR-ASD infants.

Conclusions:

Although the differences in social-emotional aspects between HR-ASD or HR-NDD infants and typically developing infants detected using the CBCL 1½-5, the weak predictive values suggested to consider the CBCL 1½-5 for monitoring HR infant neurodevelopment in association with more sensible and specific screening tools.

431.108 (Poster) The Discrepancy between Adaptive Behavior and Intelligence Is Associated with Internalizing and Externalizing Behavior Problems in Autistic Children and Youth


Background: Previous studies have demonstrated that children with autism show lower levels of adaptive behavior than their non-autistic peers. Furthermore, there seems to be a discrepancy between the level of adaptive functioning and the level of intellectual functioning in autistic individuals. Findings in autistic adults suggested that the gap between adaptive behavior and intelligence was associated with behavior problems.

Objectives: The objective of the present study was to provide increased insight in the discrepancy between adaptive behavior and intelligence in autistic children aged between 2 and 18 years. Moreover, we wanted to investigate the role of this discrepancy in behavior problems in children with autism.

Methods: Eighty-nine children (21 girls and 68 boys) with a clinical diagnosis of autism spectrum disorder participated in this cross-sectional study. The average age of the participants was 105.91 months (SD = 51.03), and the majority of them had an intelligence in the average range (total IQ estimates: M = 90.23, SD = 19.65), with 12 of them having a co-occurring intellectual disability (ID). Parents completed the Dutch translation of the third version of the Adaptive Behavior Assessment System (ABAS-3-NL; Kreemers et al., 2020) and the third version of the Children Behavior Checklist (Verhulst & Van der Ende, 2013), and intelligence was assessed using appropriate intelligence tests.

Results: The adaptive behavior of children with autism was significantly lower compared to population-based norms for all adaptive domains and for the General Adaptive Composite score, and this was also the case for the subgroup of autistic children without co-occurring ID. On average, the adaptive behavior of the autistic children was situated one standard deviation below their intelligence (M = 15.79, SD = 19.91), and this discrepancy between adaptive behavior and intelligence significantly differed from zero, t(83) = -7.27, p < .001. The gap between adaptive behavior and intelligence was even larger when focusing on the subgroup of autistic children without ID (M = -19.77, SD = 17.60). The adaptive behavior of 55% of the autistic participants was at least one standard deviation below their intelligence, and the adaptive behavior of 38% of the children with autism fell within a one standard deviation range from their intelligence, leaving 7% of the participants with an adaptive behavior score more than one standard deviation above their intelligence score. Two hierarchical linear regression analyses revealed that after controlling for age and sex, the discrepancy between adaptive behavior and intelligence was significantly predicting internalizing behavior problems, β = -.42, t(76) = -4.03, p <.001, pr² = .42, and externalizing behavior problems, β = -.24, t(76) = -2.27, p = .03, pr² = .06.

Conclusions: Using the ABAS-3-NL, our study showed lower adaptive behavior than intelligence in the majority of the 89 autistic participants aged 2-18. Adaptive behavior was associated with internalizing and externalizing behavior problems. These findings showed vulnerabilities in those with autism, beyond the diagnostic criteria. Therefore, it is warranted to examine adaptive behavior in the context of assessment and intervention, and to handle expectations based on intelligence with great care.

431.109 (Poster) The Eye of the Beholder: Sex Differences in Parent and Teacher Report of Autistic Traits on the Social Responsiveness Scale

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Background: Identifying the needs of autistic girls and women is an increasingly urgent call from researchers and stakeholders. Achieving this goal is made more difficult by the historical “male bias” demonstrated by clinicians, educators, and research measurement that tends to overlook autistic traits in females. Numerous studies have reported that parents rate their autistic daughters’ social communication difficulties as greater than those observed by clinicians. Previous studies with predominantly male samples have found mixed levels of agreement between parents and teachers and suggest that rating and agreement on social traits in autistic youth are context- or characteristic-dependent. Disparity between reports may be greater for females, who may engage in more camouflaging behaviors in classroom settings and are at risk of being overlooked by teachers.
Objectives: The current study aims to examine potential discrepancies between parent and teacher rated autism characteristics in a large sample of males and females. Based on previous research, we predicted that the difference between parent and teacher reports would be greater for females, with teachers underreporting autism characteristics.

Methods: Data were drawn from the Simons Simplex Collection database of individuals for whom both parent and teacher scores on the Social Responsiveness Scale (SRS) were available. The final sample included 388 individuals (50% male) matched on age ($M=8.88$, $SD=3.53$, range from 4 to 17.58 years) and full-scale IQ ($M=74.8$, $SD=27.14$, range from 19 to 142). Eighty percent of the included sample was white. The raw total and five subscale scores from the SRS were used. We opted to use raw scores over T-scores, which may mask sex differences through sex-normed data transformation. Parametric tests were used to evaluate sex differences in mean scores for parent and teacher responses and differences between parent and teacher scores.

Results: Mean total and subscale scores are reported in Table 1. Despite no reported sex differences from parents on the SRS, males received significantly higher scores (i.e., more indicative of autism) than females in the teacher-reported raw total score, $t(378) = -4.23$, $p<.001$, $d=.43$, and all teacher-reported subscales including Social Awareness, $t(380) = -3.23$, $p<.001$, $d=.33$, Social Cognition, $t(377) = -3.64$, $p<.001$, $d=.37$, Social Communication, $t(379) = -3.97$, $p<.001$, $d=.40$, Social Motivation, $t(381) = -2.84$, $p=.01$, $d=.29$, and Restricted Repetitive Behaviors, $t(384) = -4.23$, $p<.001$, $d=.44$. Additionally, parent-reported scores were significantly higher for females than teacher-reported scores on the Social Awareness, $t(373) = 2.34$, $p=.02$, $d=.24$, Social Cognition, $t(371) = 2.9$, $p=.004$, $d=.29$, and Restricted Repetitive Behaviors, $t(382) = 3.61$, $p<.001$, $d=.36$, subscales, as well as on the raw total score, $t(366) = 2.78$, $p=.006$, $d=.28$. There were no significant sex differences between parent-report and teacher-report for males.

Conclusions: The findings from previous studies that parents of autistic children tend to rate their child’s characteristics and traits as more indicative of autism compared to teachers were replicated in this study, but only for the female sample. This builds on previous research surrounding teacher observations towards autistic females and suggests a need for improved school assessment and parent-teacher collaboration for this population.

431.110  (Poster) The Impact of an Older Siblings Diagnosis on Parent Perceptions of Infant-Siblings Development and Behavior: And Exploratory Study

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Background:

Screening infants for likelihood of autism is imperative for connecting families with services. While screening is considered best practice, parents’ expression of concerns may initiate this process sooner (Becerra-Culqui et al., 2018). While parents of infant siblings at elevated familial likelihood of autism report concerns earlier and in greater quantity than parents whose older children have no diagnosis and those that are first-born (Herlihy et al., 2016; Sacrey et al., 2015), it is unclear whether behavioral nuances are also recognized by parents. Further, it is unknown how the experience of raising a first-born or older child with or without developmental delays informs parents’ reports of infant behaviors on autism screening measures.

Objectives:

This study aimed to determine if having an older child with autism, or a related neurodevelopmental condition, is associated with parents’ perceptions about developmental concerns and the frequency of risk signs reported on the First Years Inventory v3.1 (FYIv3.1).

Methods:

A community sample of infants (n=443), age 6 to 16 months, was recruited from the California state birth registry. Caregivers completed a demographics questionnaire, Developmental Concerns Questionnaire (DCQ), and FYIv3.1. Age-specific risk cutoffs for two FYIv3.1 domains, Social Communication (SC) and Sensory Reactivity (SR), were determined using normative data. Parents who expressed some or many concerns on the DCQ were categorized as having a concern. The sample was split into four subgroups: Infant siblings of children with autism (AUT-IS), infant siblings of children with another diagnosis (OD-IS), infant siblings of typically-developing children (TD-IS), and first-born (FB). We analyzed frequency distributions of parent-reported concerns (e.g., some concerns, many concerns, no concerns), FYI pass/fail rates, and the amount by which infants either missed or surpassed the two domain risk cutoffs for each subgroup.

Results:

Participants (N=443) ranged in age from 6 to 16 months (mean=10.3; SD=3.0). Approximately half were males. The sample consisted of AUT-IS(n=16; 4%), OD-IS(n=16; 4%), TD-IS(n=201; 45%), and FB(n=210; 47%).
Parents of AUT-IS had the highest rate of developmental concern with 19% expressing some or many concerns, followed by TD-IS (11%), FB (7%), and OD-IS (6%). Table 1 provides the breakdown of concerns and FYI pass/fails by group. Notably, 38% of AUT-IS parents and 31% of OD-IS parent expressed no concerns, yet they failed the FYIv3.1, indicating that the infant was at elevated likelihood for ASD.

Figure 1 shows how much the domain-specific mean scores deviated from the cutoffs. 63% of AUT-IS failed the FYI due to meeting threshold on social communication. Parents of AUT-IS that failed the social communication domain did not report any developmental concerns.

Conclusions:

These results do not support a hypothesis of increased sensitivity. Results suggest close monitoring of AUT-IS, particularly for social communication development, given the lack of concordance between parent-reported concerns and risk scores in this domain. Additionally, findings indicate the significance of defining “developmental concerns” prior to providing parent education and screening, as this imprecise language may lead to inaccuracy. Broadly, this study demonstrates the importance of screening all infants for autism, even when a parent does not express concerns.


Background: Prevalence rates of ASD are lower for Hispanic/Latinx children than non-Hispanic White and Black children (Maenner et al., 2020). Although this gap is closing, a disparity still exists in many locations within the US (Maenner et al., 2021). Clinical assessment of children with suspected ASD relies heavily on parent report of symptoms, including use of norm-referenced parent-report measures. However, ethnicity may affect parent report of child behavior. Hispanic/Latinx parents were found to report fewer overall concerns and fewer child behavior problems than White/Anglo parents (Blacher et al., 2014; Magana & Smith, 2013). Language background may also affect symptom reports. Blacher et al. (2019) found Spanish-speaking Hispanic/Latinx mothers reported greater severity of symptoms on an autism questionnaire than English-speaking Hispanic/Latinx mothers, even when clinician observational ratings of behaviors did not differ between the two groups. Considerations of language and ethnic background may be important to inform clinician interpretation of results from norm-referenced parent-report measures.

Objectives: To examine differences in parent endorsement of behavior difficulties on the English and Spanish versions of the Autism Spectrum Rating Scales (ASRS) and Behavior Assessment Scales for Children (BASC-3).

Methods: The sample is comprised of 90 Hispanic/Latinx children, ages 2 to 5, who received an ASD diagnosis at a university-based specialty autism diagnostic clinic in Florida. Children were referred through local Part C and Child Find services as part of a services grant providing no-cost evaluations for children suspected of having ASD. The sample consists of 44 females (48.9%) and 46 males (51.1%) who had a mean age of 46.07 months (SD=9.73) and a NVIQ of 72.56 (SD =24.71). Parents were English-speaking only (31.1%), Bilingual (51.1%), or Spanish-speaking only (17.8%). Parents completed the questionnaires based on their preferred language: English (n = 44, 48.9%) or Spanish (n = 46, 51.1%). The two groups did not differ significantly in terms of child age, gender ratio, NVIQ, or parent education.

Results: There were no group differences in DSM-5 clinician-assigned severity levels for social communication or restricted repetitive behaviors or in ADOS-2 Social Affect or Restrictive Repetitive Behavior Severity scores. However, lower ADOS-2 Total Severity scores were seen for children of families whose preferred language was Spanish (M=5.65, SD=2.532) compared to those families who completed assessment measures in English (M=6.66, SD=2.272), t (88) = 1.983, p=.050, d =0.418. No statistically significant differences were found between the two groups for scores on either the BASC-3 or the ASRS (see Table 1).

Conclusions: These findings add to a growing literature exploring the impact of language proficiency on the diagnostic process for Hispanic/Latinx children referred for autism evaluations. Among children who received a diagnosis of ASD, similar levels of behavioral difficulties were reported by parents who completed questionnaires in English versus Spanish. However, this was despite a higher level of overall symptom severity on the ADOS-2 for English dominant families in our sample, suggesting that additional research is needed to better understand how language preference and proficiency affects the diagnostic process.

431.112 (Poster) The Longitudinal Development of Cognition, Co-Occurring Conditions and Diagnostic Features in Children at Elevated and Typical Likelihood for Autism

Background:

Studies show that very preterm born children (VP-children) and younger siblings of children with autism are at elevated likelihood (EL) to develop autism or the broader autism phenotype (BAP) (Ozonoff et al., 2011; Vermeirsch et al., 2020). Prospective follow-up studies incorporating these EL-children have contributed to our knowledge on early trajectories of autism. Few EL-infant studies, however, have monitored their sample beyond age three, which is important to get a better understanding of the development of autism, subthreshold manifestations, co-occurring conditions, and differences between and/or within different EL-groups.

Objectives:

- Investigate whether community diagnoses and autism features at school-age are consistent with clinical best estimate (CBE) diagnoses of autism/BAP at age three in a sample of VP-children and EL-siblings;

- Examine cognitive development;

- Explore the presence and development of co-occurring conditions.

Methods:

A total of 224 children who took part in a prospective study until age 3, were invited for follow-up at school-age. Five of them could no longer be reached and 42 dropped out; data of 49 VP-children (22 girls; mean age=9.06 years), 57 EL-siblings (27 girls, mean age=11.23 years) and 56 children at typical likelihood for autism (TL-children; 21 girls, mean age=10.97 years) have been analyzed. Data of the remaining 15 children will be added in the next months. Assessments included intelligence testing, ADOS-2 and questionnaires on autism features and emotional and behavioural functioning.

Results:

Although quite some developmental differences could be observed in our preschool VP-sample –62.8% received a CBE outcome of autism, BAP or atypically developing– only 25.6% had one or more community diagnoses at school-age. For the EL-siblings this was respectively 43.4% and 50.9%. Table 1 provides an overview of the agreement between CBE at age 3 and community diagnoses at school-age, indicating moderate agreement in EL-siblings, but poor agreement in VP-children. This is further supported by the finding that SRS-2 scores at school-age are significantly correlated with CBE in EL-siblings (r=.551, p=.001) but not in VP-children (r=.169, p=.304).

Concerning cognitive development, the IQ-scores of all three groups differed significantly from each other (p<.001) at age three (TL-group scoring highest; VP-group lowest). At school-age only the difference between TL- and VP-group remained significant (p<.001). A repeated measures ANOVA showed a significant interaction between time and outcome-group at school-age (TL-children, VP_typical, VP_atypical, VP_autism, sib_typical, sib_atypical and sib_autism) (F(6,127)=5.534; p<.001).

The group of EL-children with a CBE and/or community diagnosis of autism had significantly more affective difficulties (p=.005) than the other groups (TL-children, EL_typical, EL_atypical) at age 3. At school-age, group differences for anxiety (p<.001), depression (p<.001) and ADHD-features (p<.001) emerged, each time with the EL_autism group scoring significantly higher than most other groups. For hyperactivity/impulsivity, additionally the EL_atypical group scored higher than the EL_typical group.

Conclusions:

This is the first study providing insight into the longitudinal development of autism and co-occurring conditions in EL-siblings and VP-children up to school-age. Preliminary results suggest distinct pathways over time for both groups and a higher incidence of co-occurring difficulties in EL-children with autism compared to TL-children and EL-children without autism.

431.113  (Poster) The Relationship between Adaptive Behavior and Age at Diagnosis for Individuals with Autism Spectrum Disorder

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Background: Autistic individuals tend to exhibit lower levels of adaptive behavior than would be expected with their corresponding cognitive intelligence (Bertollo et al., 2020). Previous prospective research has demonstrated a curvilinear relationship between adaptive behavior skills and age for individuals with Autism Spectrum Disorder (Smith et al., 2012). Specifically, previous research has found that, in this population, daily living skills tend to improve through the early 20’s and plateau as the individual reaches their late 20’s (Smith et al., 2012). However, there has been less attention paid to the relationship between age at diagnosis and adaptive behavior scores, as measured by the Vineland Adaptive Behavior Scales- Third Edition (Vineland-3; Sparrow et al., 2016).

Objectives: The present study aimed to evaluate the relationship between Vineland-3 scores and age at evaluation for individuals who received a diagnosis of ASD from a community-based clinic setting.

Methods: Comprehensive psychological evaluations of 252 individuals aged 1-36 (Median= 8.00) with concerns of ASD were analyzed. Individuals were evaluated by clinicians at a community-based clinic setting. Evaluations were composed of formal assessments of intellectual, adaptive, and behavioral functioning. The present study used data from the Vineland-3.

Results: 51.6% (130 of 252) of the individuals who came for an evaluation received a diagnosis of ASD. Correlations between age, the various domains of the Vineland-3, and the Vineland Adaptive Behavior Composite were computed for the subset of the individuals who received an ASD diagnosis. Among these individuals, age and Vineland Socialization standard scores were found to be weakly negatively correlated, r(128)= -.267, p<.001; age and Vineland Daily Living Skills standard scores were found to be moderately negatively correlated, r(128)= -.396, p<.001; age and Vineland Communication standard scores were found to be moderately negatively correlated, r(128)= -.406, p<.001; and, finally, age and Vineland Adaptive Behavior Composite scores were found to be moderately negatively correlated, r(128)= -.406, p<.001. There was no significant correlation found between age and Vineland Motor standard scores, r(78)= -.174, p=.122.

Conclusions: There was a significant negative correlation between age at diagnosis and Vineland-3 adaptive behavior scores in all domains except for the motor domain. These findings point to a larger deficit in adaptive behavior for individuals with ASD who are diagnosed at an older age. They also replicate the findings of previous studies into the relationship between adaptive behavior scores and age at diagnosis and further support the development and maintenance of interventions aimed at addressing deficits in adaptive behavior (Klin et al. 2007).

431.114 (Poster) The Social, Adaptive and Cognitive Profiles of Girls and Boys Participating in a Prospective Longitudinal Study from Infancy into Mid-Childhood


Background: Sex differences in autism are well-established, and the possibility of a distinct profile in girls and women with autism has been widely investigated. Prospective longitudinal studies of children at elevated likelihood of autism diagnosis offer the potential to explore the developmental trajectory of autism symptomatology, as well as providing an unbiased context to explore the emerging profile of autism in girls.

Objectives: The current study aims to investigate the longitudinal patterns of adaptive and cognitive skills from infancy through mid-childhood, with a focus on differences between girls and boys later diagnosed with autism. We predict that children with autism will have lower socialisation skills than their non-autistic counterparts, independent of overall cognitive ability, that girls with autism will have higher socialisation skills over time than their male peers and that this advantage will be maintained into mid-childhood.

Methods: The British Autism Study of Infant Siblings (BASIS) is a prospective longitudinal study of children at elevated likelihood (EL) of autism diagnosis due to having an older sibling with autism and those at typical likelihood (TL) of autism with no family history. Children are assessed at approximately 10, 14, 24 and 36 months, and finally between 6 and 10 years of age. At each visit, parents complete the Vineland Adaptive Behavior Scales (VABS) and children’s overall cognitive ability is assessed directly using the Mullen Scales of Early Learning (MSEL) (visits 1 to 4) or the Wechsler Abbreviated Scale of Intelligence (WASI) at the final visit. Following the mid-childhood visit, a best-estimate research diagnosis of autism vs not-autism is made for children in the EL group (EL-Autism and EL-Not Autism, respectively), based on gold-standard autism diagnostic instruments, researcher observation and parent report.

Results: 162 children (83 girls; 79 boys) participated through to mid-childhood, 42 of whom (16 girls; 26 boys) were given an autism diagnosis. ANOVAs investigating the main and interaction effects of visit and outcome were conducted for VABS Communication, Daily Living and Socialisation subscales and MSEL ELC/WASI FS IQ scores (Figure 1), showing overall differences between outcome groups for all measures [all F(2,775)>32.850, p<.001, partial η²>.078] with EL-Autism VABS scores significantly lower than the two other groups by mid-childhood [all F(2,151)>13.807, p<.001, partial η²>.155]. For those with an autism outcome only, girls performed better than boys.
over time on all measures (Figure 2) [all \(F(1,195)>7.665, p<.006, \text{partial } \eta^2>.038\] but by mid-childhood differences were not significant for any measure [e.g. VABS Socialisation: \(t=.328, ns, \text{Cohen's } d=.109\)].

Conclusions: Whereas children later diagnosed with autism had lower cognitive performance than their non-autistic counterparts through infancy and early childhood, by mid-childhood the EL-Autism group was comparable to the EL-Not Autism group. Vineland scores showed a relative widening gap, with Daily Living and Socialisation standard scores in particular declining into mid-childhood. Autistic girls showed an advantage over autistic boys throughout infancy and early childhood, but all scores 'converged' to some degree by mid-childhood perhaps reflecting the increasing demands from everyday social situations. These demands may impact relatively high-functioning girls as much as their male counterparts.

### 431.115 (Poster) The Utility of Gold-Standard Autism Screening Tools in Adolescents: A Functional Analysis of the Social Communication Questionnaire & Social Responsiveness Scale

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Background: The Social Communication Questionnaire (SCQ, manual cut-off=15) and the Social Responsiveness Scale (SRS-2, total t-score= 65) are considered benchmark screening measures for autism, with good sensitivity and specificity in young children. However, the limited data from samples of older children and adolescents suggest that these measures perform less well during developmental periods. Often, autism diagnosis in non-white males is underrecognized, leading to later diagnosis. Since the SCQ and SRS-2 were published, autism diagnostic criteria have changed, leading to questions of its continued efficacy as a measure, particularly for older girls and women.

Objectives: Examine the sensitivity of the SCQ and SRS-2 in a community-based sample of adolescents with a confirmed autism diagnosis, and explore gender and race-related differences in resulting scores.

Methods: Participants included 156 autistic teens (n=37 female, n=107 white) between 14-21 years old (M=1.95, SD=1.25) with FSIQ > 70 (M=101.87, SD=14.89). Parents completed the SCQ and SRS-2 at baseline as part of large-scale community-based clinical trials. All participants met criteria for autism confirmed via clinical report, school classification on an IEP, and/or an ADOS administered by trained clinicians. Calculations determined which participants met criteria based upon the most commonly used clinical cutoff scores in literature (e.g., raw scores of 11, 12, and 15 on the SCQ, and t-scores of 65, 70, and 75 on the SRS-2). Chi-squared analyses examined the impact of gender and race on participants meeting the three cutoff points from both the SRS-2 and SCQ.

Results: Sensitivity calculations indicated that 17.9% (28.6% female/ 71.4% male) of participants did not meet an SCQ score of 11 (M=16.76, SD= 6.64). That increased to 21.8% who did not meet a score of 12, and 33.3% for a score of 15 on the SCQ. Sensitivity calculations indicated similar results on the SRS-2 with 32.1% of participants not meeting the cutoff of 65 (M=70.35, SD=10.93). This increased to 51.3% for the cutoff SRS-2 score of 70, and then 67.1% for an SRS-2 score of 75. Out of 159 participants, 20% of the participants did not me on the SCQ or SRS-2. Chi-squared analyses did not indicate a significant relationship between SCQ and SRS-2 criteria and gender and race.

Conclusions: While results did not yield statistical significance, likely due to small pool of non-male and non-white participants, the overall number of participants who failed to meet on the SCQ and SRS-2 are clinically significant, as all participants had community autism diagnoses confirmed by our trained research team. Some item-level content on the SCQ is not developmentally appropriate for adolescents (e.g., imagine play with peers) leading to aberrant reporting. Greater analysis of the SCQ is important for screening purposes, given the greater feasibility of administration due to reduced participant burden (e.g., fewer items). The sensitivity of both the SCQ and SRS-2 is important to note when considering its efficacy for adolescent populations. One limitation of this project was the inability to calculate specificity. Discussions regarding the SCQ and SRS-2 should consider their efficacy for adolescents as diagnostic criteria continue to change.

### 431.116 (Poster) Virtual ASD Diagnostic Evaluations: Provider Perspectives on Differences and Adaptations from In-Person


Background: Delay in receiving an ASD diagnosis is a great public health concern (Dahiya et al., 2021); yet accessing an ASD diagnostic evaluation has historically been challenging (Wiggins et al., 2006), especially for families from underserved communities (e.g., rural, low-income, ethnically/racially diverse populations; Bishop-Fitzpatrick & Kind, 2017). The use of virtual diagnostic assessment, accelerated by the COVID-19 pandemic, has potential to fundamentally alter the ASD service landscape by addressing the significant disparities in access (Berger et al., 2021; Drahota et al., 2020). One common virtual assessment delivery method for young children is caregiver-mediated
synchronous virtual assessment (CMSVA), in which the provider coaches the caregiver through the implementation of specific assessment activities combined with a virtual clinical interview and feedback (Berger et al., 2021). Very limited research has been conducted on stakeholder attitudes about CMSVA.

Objectives: The current study examined interview data from community providers conducting CMSVAs, specifically investigating perceived differences and adaptations made as part of the virtual evaluation process, as well as the perceived outcomes (of differences) and/or intended goals (of adaptations).

Methods: Six psychologists contracted by San Diego Regional Center (SDRC) to provide ASD diagnostic assessments for young children were invited to participate. All participants had experience conducting in-person evaluations prior to switching to CMSVAs for the past 12 months. Virtual interviews were recorded and transcribed. Coding was conducted by members of the research team with over-arching themes of differences (i.e., between in-person and CMSVA) and adaptations (i.e., changes made by the provider during the evaluation) as well as corresponding coder-perceived difference outcomes and/or intended adaptation goals. Consensus coding was used to ensure agreement among coders.

Results: Most differences were noted in pre-evaluation preparation and the child assessment. Providers reported differences in data collection methods in that both providers and caregivers experienced a greater reliance on the caregiver. Both context/setting (i.e., virtual nature of the assessment) and data collection methods differences were associated with the outcome of collecting ecologically valid information, equally split between comments pertaining to collecting more information. Of note, differences in the context/setting was associated with an overwhelmingly positive outcome on evaluation reach and impact; providers noted how virtual assessment reduced several barriers to the evaluation. Overall, outcomes of differences were either overwhelmingly positive or equally positive and negative.

Regarding adaptations, the most common adaptation was adding components (time, strategies, contacts, etc.) to the evaluation. Adaptations to the evaluation process or structure were mostly associated with the goals of increasing evaluation validity and increasing caregiver comfort and engagement. During pre-evaluation preparation, adaptation goals included facilitate evaluation completion, improving evaluation validity, and increasing caregiver comfort and engagement.

Conclusions: Key findings included: psychologists perceived CMSVAs to increase both engagement and reach, and that many adaptations appeared to be designed to increase evaluation validity or caregiver comfort and engagement. These results suggest that CMSVAs may be an acceptable long-term method for evaluating, including equitable evaluation access, ASD in children. Future resources developed to support this evaluation method should focus on supporting evaluation validity and caregiver comfort and engagement.

431.117 (Poster) Towards the Improved Characterization of Minimally Verbal Children with Autism: Applications of Item Response Theory to Analyze the ESCS

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Background: Minimally verbal children are considered the enigmatic and, unfortunately, the neglected end of the autism spectrum (Tager-Flusberg & Kasari, 2013). This subpopulation has likely garnered this title due to their exclusion from research studies, which has inevitably affected their evidence base. The paucity of proper measurement tools that sensitively and accurately assess behaviors has been one limiting factor in the improved knowledge of these children. To address this issue, this study took an alternative quantitative methodological approach by repurposing item response theory (IRT) models to analyze social communication data generated by the ESCS.

Objectives: To create a hierarchy of social communication gesture difficulty.

Methods:

The final sample consisted of 453 minimally verbal children culled from four different intervention studies. The Rasch Poisson Count Model (RPCM; Rasch, 1960/1980) and its extensions (negative binomial model and its zero-inflated counterpart) were fit to the frequency of the ten initiation skills as measured by the ESCS (Mundy et al., 2003). Despite the separate functions of these skills (joint attention vs. behavior regulation), their intent of initiation was deemed as an acceptable justification to include all gestures in a single unidimensional model. Additionally, for assessments like the ESCS that have been historically analyzed using classical test theory, the RPCM is a logical progression into the IRT framework (Doebler & Holling, 2016).

Nested models were objectively compared with an LRT test, and non-nested models were compared with a Vuong test. AIC and BIC were used as additional indices to evaluate model fit.

The RPCM was estimated using the lme4 package (Bates et al., 2017). The negative binomial model was handled with lme4, but the zero-inflated model was estimated using the GLMMadaptive package (Rizopoulos, 2022). All the above analyses were conducted in R (R Core Team, 2022).
Results: The best-fitting and final model was a zero-inflated negative binomial model (ZINBM), which determined that joint attention gestures were, on average, more difficult than behavior regulation gestures. Joint attentional shows and gives were especially difficult, and behavior regulation reaches were the easiest gestures for this sample. The ZINBM separately modeled children with some gestures versus children who did not present with any gestures and determined that behavior regulation reaches and gives were likely the first gestures a child will eventually exhibit among children who currently do not exhibit gestures.

Conclusions: This study demonstrated that the use of IRT models can extract additional variability from the ESCS, thus, providing a more nuanced evaluation of the heterogeneity of social communication presentation within minimally verbal children, the vast majority who also present with profound intellectual disability (below 50 DQ). With the improved characterization of minimally verbal children, we can move towards the next phase of tailored interventions and understanding their treatment effects among subpopulations of the minimally verbal status.

431.118 (Poster) Use of Visual Aids during Caregiver Interviews to Screen for Autism Spectrum Disorder

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Background: Early diagnosis and interventions are critical factors that influence the prognosis of autism spectrum disorder (ASD). While caregiver interviews are an important source of information, they can often be subjective to bias, such as parental beliefs about their child’s development, awareness of risk signs related to ASD, and other misleading information (Eaves, Wingert, Ho, & Mickelson, 2006; Miller, Perkins, Dai, & Fein, 2017; Robledo, & Jankovic, 2017). To overcome such shortcomings, studies have suggested using visual aids to increase the accuracy during caregiver interviews by showing key social behaviors in children with and without ASD (Marrus et al., 2015; Young et al., 2020).

Objectives: To eliminate bias during caregiver interviews, we created short videos to support caregivers in understanding key social behaviors. This study explores the effectiveness of using visual aids in screening for ASD compared to pre-existing standardized caregiver interviews.

Methods: Key behaviors, composed of joint attention, echolalia, pointing behavior, use of gestures, social referencing, use of others’ hands, interactive social play, eye contact, social smiles, and restricted and repetitive behaviors (RRBs), were selected from the Behavior Development Screening for Toddlers (BeDevel; Bong et al., 2021). Caregivers were asked to select between videos showing the behaviors of a child with ASD and a child without ASD that their child resembled the most. The best clinical estimate diagnosis was based on the acquired information from the Autism Diagnostic Observation Schedule-2 (ADOS-2), the Autism Diagnostic Interview (ADI-R), and other questionnaires. The predictive value in screening for ASD was measured with the ROC curve analysis. Comparisons between the video and standardized interview (BeDevil-I) were analyzed using kappa values (k). Additionally, we explored whether the combination of visual aids with standardized interviews would improve effectiveness in screening for ASD.

Results: 91 children with ASD (M = 36.24, SD = 5.86) and 30 children without ASD (M = 32.37, SD = 7.06) were included for analysis. Social referencing, interactive social play, eye contact showed good predictability (AUC range = 0.708-0.773). There was a trend in visual aids being more effective in assessing interactive social play compared to the BeDevel-I (p = .054). However, RRBs measured by the standardized interview were better in predicting ASD (p < .01). Kappa values were highest in pointing behavior (k = 0.482) and eye contact (k = 0.480), while lowest in use of others’ hands (k = 0.134), interactive social play (k = 0.172), and social referencing (k = 0.174). The combination of visual aids and standardized interviews were found to be more effective than individual screening measures (p < .01) (Figure 1).

Conclusions: Visual aids can be helpful when interviewing caregivers. Among the selected key behaviors, complicated and sequential behaviors like interactive social play were better understood with visual references. Therefore, using such videos in combination with standardized caregiver interviews should be considered to improve screening for ASD.

431.119 (Poster) Use of the Psychomotor Vigilance Task (PVT) with School-Aged Autistic and Neurotypical Children and Its Relation to Sleep Problems: A Pilot Study

Background: Sustained attention measured by the Psychomotor Vigilance Task (PVT) is one of the primary outcomes in research on the impact of sleep deprivation in adults (Lim & Dinges, 2010). The PVT is highly sensitive to sleep deprivation and demonstrates psychometric advantages over other cognitive tests (Basner & Dinges, 2011). Attention is highly affected in neurotypical children and adults with reduced sleep, but as far as we know, no study to date has investigated the use of the PVT in autistic children (Kaida et al., 2006).

Objectives: This study primarily aimed to determine whether the PVT is feasible and accessible to school-age autistic and neurotypical children in the context of a home-based sleep study. A secondary aim was to examine preliminary relationships between sleep patterns and sustained attention using the PVT in school-age autistic children with high likelihood of autism spectrum disorder (HL+ASD), high likelihood children without autism spectrum disorder (HLnoASD), and low likelihood of autism spectrum disorder (LL).

Methods: As part of a multisite study and the longitudinal Infant Brain Imaging Study (IBIS), 73 children, age 6 to 14 years (HL+ASD n = 14, HLnoASD n = 28, and LL n = 31; Table 1), completed measures of cognitive ability (DAS-II general cognitive ability standard score) and sustained attention (PVT reaction time) and parents reported concerns about their child's sleep (CSHQ total sleep problems). Participants were also directly assessed for clinical best estimate of autism diagnosis using gold-standard measures multiple times starting at 24 months.

Results: Increased total sleep problems (CSHQ) significantly predicted increased mean reaction time (p = 0.019). We conducted a multivariate regression analysis of PVT reaction time that included participant age, general cognitive ability, total sleep problems, and diagnostic group as predictors (see Table 2). This analysis demonstrated that increased participant age significantly predicted lower mean PVT reaction time (RT, p < .001). General cognitive ability (GCA) was not a significant predictor of mean PVT reaction time (p = 0.723). Group did not improve this model. The full model significantly predicted PVT reaction time (overall R^2 = .45).

Conclusions: Greater parental sleep concerns were related to slower PVT reaction times. This is consistent with previous literature demonstrating sleep deprivation is related to increased reaction times. Additionally, results showed that as age increased reaction times decreased (i.e., children became faster), suggesting age is an important consideration in future pediatric PVT research. Furthermore, cognitive ability did not significantly impact reaction time. This is an important finding as it suggests the PVT can be used in the broader ASD population. The PVT is clearly feasible for in-home completion in pediatric autistic and neurotypical populations. Future research is needed to evaluate the relationship between sleep problems and sustained attention in autistic children using objective measures of total sleep time and in a larger sample.

431.120 (Poster) Using Endocrine Profile to Identify Subgroups Among Transdiagnostic Neurodivergent Children and Adolescents


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Background:

Autism is part of a complex group of neurodevelopmental conditions (NDCs). Emerging evidence suggests 1) high individual variability within NDCs and 2) significant overlap in clinical and biological characteristics among NDCs. The within-condition/diagnosis heterogeneity and between-condition/diagnosis overlap warrants transdiagnostic investigations that extends beyond a case-control design. To date, such studies have demonstrated genetic, neural, and behavioural overlap among NDCs. Despite implications of endocrinological factors in NDC etiology and symptomatology, the field lacks transdiagnostic investigations of hormonal and endocrine-related phenotypic characteristics.

Objectives:

We used a data-driven, transdiagnostic approach to identify and characterize NDC subgroups with distinct endocrine profiles. We then examined endocrine-profile subgroups for differences in dimensional behavioural phenotypes, including externalizing and internalizing symptoms, across NDC diagnostic categories and typically developing children and adolescents.

Methods:
This study was conducted using clinical and bio-banked serum data from the Province of Ontario Neurodevelopmental Disorders (POND) Network, Canada. Participants (N=196) included children and adolescents between 3-21 years of age with a diagnosis of autism (N=117; 92 males, 25 females; mean age=10.3 years); ADHD (N=29; 27 males, 2 females; mean age=12.0 years); other NDCs, including sub-threshold ADHD, OCD, or intellectual disability (N=12; 6 males, 6 females; mean age=11.2 years); and typically developing individuals (N=38; 20 males, 18 females; mean age=14.1 years). Using liquid chromatography–mass spectrometry and immunoassay, we measured 16 endocrine analytes from hormonal systems including growth and metabolism, hypothalamic-pituitary-adrenal (HPA), and hypothalamic-pituitary-gonadal (HPG) axes (Figure 1). We used principal component analysis (PCA) for data-reduction for 16 analytes, and then used k-means clustering to identify subgroups with distinct endocrine profiles across diagnostic groups (Figure 1). Kruskal-Wallis H test was used to determine between-subgroup differences in externalizing and internalizing symptoms (measured by the Child Behavior Checklist, CBCL).

Results:

Cluster analyses consistently identified three diagnosis-agnostic subgroups with distinct endocrine profiles. There were significant between-subgroup differences in externalizing symptoms (H(2)=12.04, p=.002), but not internalizing symptoms among these endocrine-related subgroups (H(2)=2.96, p=.227). The three subgroups differed in NDC diagnoses composition, sex composition, and age range. Pairwise comparisons showed that the subgroup with significantly higher externalizing symptoms had lower growth factor (IGF-1) and lower stress-related hormones (cortisol and corticosterone) compared to the other two subgroups (p<.01 for all comparisons). Due to potential confounding effects of NDC diagnosis and sex, we repeated the subgroup-comparison analysis using only those with a diagnosis of autism and only males, respectively. The endocrine-profile subgroup differences in externalizing symptoms persisted among those with autism (H(2)=13.88, p=.001) and among males (H(2)=7.96, p=.02). Age had a negative correlation with externalizing symptoms (r(141)=-.34, p<.001). Thus, despite subgroups differ by age, we further performed the Quade’s test to covary for age to explore remaining between-subgroup differences; here the endocrine-profile subgroup differences in externalizing symptoms were observed when comparing across endocrine-profile subgroups among those with autism (F(2,114)=6.863, p=.002).

Conclusions:

Our findings suggest that distinct endocrine profiles may serve as potential stratification markers for externalizing behaviour challenges across children and adolescents with/without NDCs, with most robust findings in those diagnosed with autism.

431.121 (Poster) Utility of the Screening Tool for Autism in toddlers & Young Children (STAT) in Autism Diagnosis


Background: The combination of high autism prevalence and dearth of qualified evaluators results in families routinely waiting 1 to 2 years for diagnostic assessment. This puts children in a holding pattern during critical developmental periods when early intervention can capitalize on brain plasticity to optimize outcome. Traditional evaluation tools contribute to the problem of long wait times due to considerable training requirements and extensive administration and scoring times. This study explores the diagnostic utility of the Screening Tool for Autism in Toddlers & Young Children (STAT) as one possible solution to patient backlog. The STAT is a Level Two screener for autism detection in children 24 to 36 months of age with extended norms down to age 14 months. The STAT takes approximately 20 minutes to administer and assesses key social and communicative behaviors including imitation, play, requesting, and directing attention.

Objectives: Determine the agreement of the STAT in differential diagnosis of autism in an outpatient clinical population, compared to the more time and resource-intensive Autism Diagnostic Observation Schedule-Second Edition (ADOS-2). Examine the sensitivity and specificity of the STAT to refine clinic models and reduce wait time for evaluation.

Methods: Neurodevelopmental Disorders Clinic patient log and EPIC software were used to identify 317 consecutive patients between the ages of 14 and 36 months seen for diagnostic evaluation in our outpatient clinic between September 1, 2019 and April 30, 2022. Patients were referred from primary care or self-referred. Demographic information and test results for the variables of interest (STAT and ADOS) were abstracted from the chart. Comparative statistical analysis was completed on 44 patients who were administered both the STAT and the ADOS.

Results: A total of 44 patients (75% male) were administered both the STAT and ADOS. Agreement was 90.9% (40/44; 95% CI 78.3-97.5%) between the two measures (identified as not at risk by the STAT and non-spectrum by the ADOS-2, or at risk by the STAT and autism spectrum disorder or autism by the ADOS-2, Table 1). Using clinical diagnosis as the measure of truth, 33 of the 44 received a clinical diagnosis of ASD. The sensitivity of the STAT was 90.9% (30/33; 95% CI 75.7-98.1%) and the sensitivity of the ADOS was 100%
Conclusions: The STAT showed high sensitivity and specificity in differentiating children with autism from those with other neurodevelopmental disorders in this outpatient clinic population. There was excellent agreement between the STAT and ADOS-2. The STAT may be an acceptable diagnostic tool in children 14-36 months of age who present with concerns for autism. Using the STAT for children at lower and higher risk for autism based on clinical judgment of initial symptom presentation may decrease the risk of false positives and false negatives. The more time and resource-intensive ADOS-2 might be reserved for children with more complex or borderline autism presentations.

Results: A total of 51 participants expressed interest in the study, with 39 invited to complete round 1 of the Delphi (with 36 responses received). For the second round, 31 participants were invited, 26 responded, and 25 participants were invited and responded to the final round. Participants had a median of 13 (range: 5-31) years of experience and included paediatricians, occupational therapists, speech pathologists and psychologists. Across the sample, participants had worked with all NDC diagnoses included in the DSM-5.

By the final round, of the 113 0-5 early NDC items assessed, 103 (91%) were deemed relevant with only 4 (4%) deemed irrelevant. For the specific 0-5 core sets, 68 (92%)of the Autism, 43 (91%) of the ADHD, 27 (93%) of CP, and 68 (94%) of EDD were deemed relevant. Only 1-4% of the specific 0-5 Core Sets’ codes were deemed irrelevant, with most being environmental factor codes. Of the codes included in the comprehensive NDC Core Sets but not the 0-5 specific Core Sets, only 27 (47%) were deemed relevant, while 19 (33%) were deemed irrelevant. Most of the codes deemed relevant from outside the 0-5 Core Sets were Body Functions or Activity and Participation codes.

Conclusions: The ICF Core Sets for young children with NDCs are appropriate to use to guide the assessment of functioning in the Australian context, supplemented by additional codes from the broader NDC Core Sets.

431.122 (Poster) Validation of the International Classification of Functioning, Disability and Health Core Sets for Young Children with Neurodevelopmental Conditions in the Australian Context
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Background: Being able to complete accurate and valid assessments of functioning for young children (under 6 years) with NDCs is vital for access to funding, diagnosis and services in the Australian context. The International Classification of Functioning, Disability, and Health (ICF) and ICF Core Sets provide a useful foundation for such assessments. These ICF Core Sets present a shortlist of ICF Codes (across body functions and structures, activities and participation and environmental factors) relevant to functioning in specific populations. ICF Core Sets have been developed for Autism, Attention-Deficit/Hyperactivity Disorder (ADHD), Cerebral Palsy (CP) and Early Delay and Disability (EDD), including specific sets for those aged 0-5 years. However, these Core Sets have not yet been validated to determine their appropriateness for the Australian context.

Objectives: To validate the ICF Core Sets for 0-5-year-olds with NDCs (Autism, ADHD, CP, and EDD) in the Australian context from the perspective of clinical and research professionals.

Methods: The ICF 0-5 Core Sets for NDCs were validated through an online Delphi survey incorporating the item level Content Validity Index (I-CVI). Australian clinicians and/or researchers who were experienced in assessing young children with, or suspected of, NDCs were invited to participate through convenience sampling. The Delphi was completed across three rounds, where participants were asked to rate each code of the Comprehensive Core Sets for NDCs on a scale of relevance. Prior to data collection, the threshold for agreement was set at 80% (I-CVI of 0.8), for deeming codes relevant or irrelevant. If a code did not meet the threshold for relevant or irrelevant, it was re-assessed in the subsequent round.

Results: A total of 51 participants expressed interest in the study, with 39 invited to complete round 1 of the Delphi (with 36 responses received). For the second round, 31 participants were invited, 26 responded, and 25 participants were invited and responded to the final round. Participants had a median of 13 (range: 5-31) years of experience and included paediatricians, occupational therapists, speech pathologists and psychologists. Across the sample, participants had worked with all NDC diagnoses included in the DSM-5.

By the final round, of the 113 0-5 early NDC items assessed, 103 (91%) were deemed relevant with only 4 (4%) deemed irrelevant. For the specific 0-5 core sets, 68 (92%)of the Autism, 43 (91%) of the ADHD, 27 (93%) of CP, and 68 (94%) of EDD were deemed relevant. Only 1-4% of the specific 0-5 Core Sets’ codes were deemed irrelevant, with most being environmental factor codes. Of the codes included in the comprehensive NDC Core Sets but not the 0-5 specific Core Sets, only 27 (47%) were deemed relevant, while 19 (33%) were deemed irrelevant. Most of the codes deemed relevant from outside the 0-5 Core Sets were Body Functions or Activity and Participation codes.

Conclusions: The ICF Core Sets for young children with NDCs are appropriate to use to guide the assessment of functioning in the Australian context, supplemented by additional codes from the broader NDC Core Sets.
Background: Although there is no difference among racial/ethnic groups in age of parents’ first concern about autism (Jang et al., 2014) or for overall prevalence (Maenner et al., 2021), disparities in average age of autism identification and treatment initiation persist (Maenner et al., 2020). To help address these disparities and equitably serve all children, diagnostic tools should be examined for their validity in different racial/ethnic groups.

The Toddler Autism Symptom Inventory (TASI) is a novel semi-structured diagnostic interview for clinicians interviewing caregivers of children aged 12-36 months with suspected autism. We previously compared the validity of the TASI in non-Hispanic White and Black toddlers (Coulter et al., in press) and found that the TASI worked comparably well in both groups. In the current project, we compare the TASI performance in Hispanic and non-Hispanic White toddlers.

Objectives: Determine the validity of the recommended TASI cutoff score of 7 in Hispanic and non-Hispanic White toddlers.

Methods: Children (n=415) aged 12 to 36 months were referred for a diagnostic evaluation after a positive screen or pediatrician concern. Caregivers reported their toddler’s race and ethnicity; 50.4% of the sample was White (n=209). The remainder reported other racial identities. Of the White participants, 75.6% reported a non-Hispanic ethnicity (n=158), 20.6% a Hispanic ethnicity (n=43), and 3.8% did not report ethnicity (n=8). Of the non-White Hispanic participants, the different racial groups were small (n<15). Children whose parents reported a race other than White, and those who did not report ethnicity were not examined here.

Diagnostic evaluations included measures of developmental functioning (Mullen Scales of Early Learning Composite, ELC) and autism symptoms (Autism Diagnostic Observation Schedule-2 Calibrated Severity Score (ADOS-2 CSS)). Clinicians either administered the TASI before the ADOS, or these measures were administered by different clinicians. There is a strong positive correlation between ADOS-2 CSS and TASI total score (Table 1).

Children were assigned diagnoses of ASD, other developmental delay (DD), or typical development/no diagnosis (TD/ND).

Results: Significant differences between the non-Hispanic and Hispanic White toddlers were found in mean developmental level (Mullen ELC) and SES measured by maternal education. These group-level differences must be considered in the following results.

There were no significant group differences in age at evaluation and rate of ASD diagnosis. Among children with non-ASD classifications, more Hispanic children were diagnosed with DD and fewer with TD/ND compared to the non-Hispanic group. In the ASD group, there were no differences in autism severity as measured by ADOS CSS; and TASI score (Table 1).

Validity of the TASI is similar in both groups (Table 2). Area under the curve in ROC analyses was over .9 for both groups, which is considered outstanding. Sensitivity was .88 and specificity ranged from .78-.84. The TASI was slightly less specific for Hispanic participants, as some DD participants were positive on the TASI.

Conclusions: The TASI appears to have similar validity in both non-Hispanic and Hispanic White toddlers; however, the group difference in SES is an important consideration when interpreting the differences in developmental delay.

431.124 (Poster) Verbal IQ and Socioeconomic Status Predict Autism Diagnostic Timing for Individuals Assigned Female at Birth

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Background: Timely autism diagnosis is crucial for access to needed supports. Initial data links female sex assigned at birth to late diagnosis (Kavanaugh et al., 2021), and late autism diagnosis may be associated with verbal strengths in those assigned female at birth (AFAB; Salomone et al., 2016). Socioeconomic status (SES) predicts higher verbal skills (Noble et al., 2007), yet access to resources may facilitate diagnosis; thus, SES likely contributes to diagnostic timing in complex ways. Understanding factors contributing to diagnostic timing is important for autistic well-being, as late-diagnosed individuals report lower quality of life (Atherton et al., 2022).

Objectives: To better understand the roles of verbal IQ and sex assigned at birth in autism diagnostic timing, we examined these factors in two independent cohorts: a sex-balanced research sample (N=164, AFAB: 71) and a large clinical sample (N=641, AFAB: 177). We hypothesized that higher Verbal IQ (VIQ) would predict later diagnosis, particularly among AFAB individuals. Greater socioeconomic,
phenotypic, and etiological diversity in the clinical sample also permitted us to **explore the contribution of SES and sample inclusion/exclusion criteria** to these models.

**Methods:**

The **research sample** included previously-diagnosed youth aged 8-17 years \( [y] \) \((M[SD] = 12.5[2.88] y; \text{diagnostic age} = 5.84[3.58] y)\). Cohort exclusion criteria included full scale IQ\(\leq70\) or non-idiopathic autism. The **clinical sample** included individuals aged 2-25y \((M[SD] = 9.80[3.90] y)\) whose data was obtained during initial diagnostic assessment. Child Opportunity Index (COI; Noelke et al. 2020) scores were available for this cohort; higher scores reflect greater financial, health, and educational resource availability in the child’s neighborhood. All research questions were tested by fitting multiple linear regression models with diagnostic age as the outcome.

**Results:**

**Research Sample.** A model including the interaction between sex and VIQ \((F(2, 161) = 6.94, p = 0.001)\) indicated that VIQ positively predicted age of diagnosis for participants assigned female \((β = 0.39, p = 0.001)\) but not male \((β = 0.16, p = 0.101)\) at birth (Fig.1). **Clinical Sample.** In a model \((F(7, 633) = 3.58, p = 0.001)\) including VIQ, COI, sex, and their interactions, VIQ \((β = 0.14, p = 0.002)\) and VIQ×COI \((β = 0.10, p = 0.028)\) were significant predictors of diagnostic age. Fitting the same model in a subsample that applied the exclusion criteria from the research sample to the clinical cohort \((N = 484, \text{AFAB: } 110; \text{age: } 9.88[3.92] y), the three-way interaction among VIQ×COI×Sex became statistically significant \((β = -0.26, p = 0.013; \text{Fig.2})\); for AFAB participants, higher VIQ was associated with later diagnosis, with this association strengthening as COI decreased, while those assigned male at birth with low COI showed no association between VIQ and diagnostic timing.

**Conclusions:**

In samples with idiopathic autism diagnoses and no intellectual disability, higher verbal IQ predicted later diagnosis for AFAB individuals. SES may be especially relevant in these samples, with varying impacts depending on assigned sex at birth. For AFAB individuals, lower SES may exacerbate the association between higher VIQ and later diagnosis. When intellectual disability and syndromic autism were represented in analysis, the impact of sex assigned at birth was reduced, and VIQ and COI alone interacted to predict diagnostic timing, suggesting that these features may invite clinical attention in a way that potentially mitigates sex-based ascertainment bias.

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**431.125 (Poster)** Time Is of the Essence: Age of Diagnosis Drives Psychopathology in Autism


**Background:**

Age of autism diagnosis has known links to sex assigned at birth (hereafter, “sex”), such that assigned female at birth (AFAB) versus assigned male at birth (AMAB) individuals are delayed or “missed” entirely in the diagnostic process. Later diagnosed individuals, especially AFAB individuals, demonstrate increased anxious and depressive symptoms. Unpacking the linkages among sex, age of autism diagnosis, and co-occurring psychopathology requires consideration of ascertainment methodology, which has been documented to impact reported sex ratios in autism diagnosis (e.g., D’Mello et al., 2022; Loomes et al., 2017).

**Objectives:**

Using regression-based mediation models to understand individual pathways and the overall model, we hypothesized age of autism diagnosis would mediate the relationship between sex and anxious/depressive symptoms.

**Methods:**

Youth \((N = 1163)\) from two samples were included in the present study: one from an outpatient autism/neuropsychology evaluation clinic \((n = 1035; 22.9\% \text{ AFAB})\) and the other research-based recruitment that prioritized a sex-balanced sample \((n = 128; 43.0\% \text{ AFAB})\). Anxious and depressive symptoms were assessed through: the Child Behavior Checklist, 1.5-5 \((n = 611)\) or 6-18 \((n = 546)\), or the Adult Behavior Checklist \((n = 6)\). To evaluate anxious and depressive symptoms without utilizing sex-normed \(t\)-scores, the average of both male- and female-normed \(t\)-scores were calculated and used for analyses. All data from the clinical sample were collected at the time of diagnosis.
Because diagnostic age was caregiver-reported through structured interview at the time of participation in the research sample, age at participation was added as a covariate to all relevant analyses.

Results:

Age of autism diagnosis was significantly later in the clinical ($M=6.75$, $SD=4.20$, range: 1.3-19.7 years) than the research sample ($M=6.12$, $SD=3.75$, range: 1.3-17 years), $t(169.06)= -1.77$, $p > .001$. Results from the two samples converged in two ways: later diagnostic age predicted greater anxious and depressive symptoms, and sex did not predict anxious symptoms (see Figures 1 and 2). In the clinical sample, despite sex not being predictive of anxious or depressive symptoms, there was a significant indirect effect of sex on anxious and depressive symptoms through age of autism diagnosis (95% BCa CI$_{anx}$ [0.0844, 1.3604]; 95% BCa CI$_{dep}$ [0.0624, 1.06]), such that later-diagnosed AFAB individuals had greater symptoms. Findings from the research sample indicate no such mediation, and sex did not predict diagnostic age (95% BCa CI$_{anx}$ [-0.0187, 0.1872]; 95% BCa CI$_{dep}$ [-0.1796, 1.6561]). See Figures 1 and 2 for all model coefficients.

Conclusions:

Through two different samples, age of autism diagnosis emerged as a potent predictor of psychopathology. Diagnostic age acted as a driver of the association between sex and psychopathology only in the clinical sample. This suggests research samples, even those with intentionally sex-balanced designs, diverge from clinically-based samples in ways that alter findings related to the impact of sex. Limitations of this study include: reliance on cross-sectional data and the lack of data on gender identity. Nonetheless, it provides an important impetus for accelerating autism diagnosis, enhancing tools for recognizing autism in AFAB individuals, and grounding research with real-world ascertainment strategies.

431.126 (Poster) Location Is Everything: Unpacking the Link to Age of Autism Diagnosis

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Background:

Diagnostic timing is a vital public health priority as early diagnosis facilitates access to early intervention, which leads to better outcomes for autistic individuals. Geographic factors likely relate to diagnostic timing due to uneven distribution of autism resources and specialists across the United States. There is some evidence that those living in the Northeast may have greater access to diagnostic resources and that those living in rural areas have more limited access to healthcare services and specialists compared to those in urban areas.

Objectives:

Aiming to better understand geographic factors’ association to diagnostic timing, we hypothesize: 1) those living in non-metropolitan areas will have a later age at autism diagnosis, 2) those living in census-designated regions outside of the Northeast will have a later age at autism diagnosis.

Methods:

The sample included participants from the National Survey of Children’s Health (NSCH) 2021 caregiver-report survey, which is conducted by the US Census Bureau to assess the health/well-being of US children ages birth-17. Participants with a caregiver-reported autism diagnosis who had not moved (i.e., lived in same geographic location) were included in analyses ($n=308$). The majority of the sample was male (79.2%), White (74.4%), and non-Hispanic/Latinx (83.1%). Current child age ranged from 1-17 ($M=8.65$, $SD=4.85$). Variables of interest included: whether/not participants lived in a metropolitan statistical area (MSA: high population density and urbanized area), and census-designated regions (Northeast, Midwest, South, West). Known predictors of late diagnosis were included as covariates: assigned sex, household income, race and ethnicity, and autism severity.

Results:

There was a significant difference in diagnostic age for those living in a MSA ($M=4.21$, $SD=3.13$) versus those who did not ($M=5.26$, $SD=3.80$), $t(306)=-2.02$, $p < .05$ (see figure 1). Results from a univariate ANCOVA revealed a significant difference in diagnostic age by census-designated regions, $F(3,299) = 3.31$, $p < .05$. After adjusting for multiple comparisons, pairwise comparison illuminated significant differences between the Midwest ($M=5.08$, $SD=3.37$) and South ($M=4.68$, $SD=2.47$) census-designated regions ($p = .02$). In a linear regression to predict diagnostic age from MSA status, census-designated regions, and the interaction between the two, the interaction term was significant ($B = -0.32$, $p = 0.04$), and the overall model (including covariates) accounted for 15% of the variance in diagnostic age.

Conclusions:
Overall, these findings are consistent with previous literature that those living in urban areas are diagnosed earlier, likely as a function of increased availability of providers and access to services. Inconsistent with previous literature, those living in the Northeast did not have an earlier diagnostic age compared to other regions; in fact, those living in the South had the youngest diagnostic age. The intersection of urbanicity and region emerged as a significant predictor of diagnostic age, suggesting those living outside of MSAs in certain regions may experience a compounding factor leading to later diagnosis. Future research should examine mechanisms underlying these differences, specifically the role of access to services.

431.127 (Poster) Reliability and Acceptability of the Vineland-3 for Australian Children and Youth with Neurodevelopmental Conditions

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Background:

The Vineland-3 is used to assess the functioning of children and youth with neurodevelopmental conditions, including autism, attention deficit hyperactivity disorder, communication disorder, global developmental delay, intellectual disability and motor disorder. Despite widespread use as a clinical and research measure, there is a paucity of psychometric evidence for the current version, and comparison with the International Classification of Functioning, Disability and Health has demonstrated limited content validity.

Objectives:

This study explored the reliability and acceptability of the Vineland-3 using a large Australian sample. Specifically, it evaluated internal consistency; test-retest reliability of the Parent/Caregiver Form; inter-rater reliability of the Interview Form; and parallel forms reliability between the Parent/Caregiver and Interview Forms. Acceptability was explored from the perspective of caregivers as the informants.

Methods:

Caregivers of 172 children and youth with neurodevelopmental conditions participated in clinical assessments. Of these, 141 participants completed Assessment 1, which involved the administration of the Vineland-3 Parent/Caregiver Form. Based on a randomisation process, participants proceeded to either Assessment 2a to repeat the Vineland-3 Parent/Caregiver Form, or Assessment 2b to complete the Vineland-3 Interview Form. To boost sample sizes, additional recruitment resulted in another 31 participants being streamed directly into Assessment 2b. Caregivers of 46 children and youth completed a semi-structured interview exploring the acceptability of the Vineland-3.

Results:

The Vineland-3 demonstrated good to excellent internal consistency (for sub-domains where analysis was possible), and moderate to excellent test-retest reliability and inter-rater reliability. Parallel forms reliability showed significant correlations between the Parent/Caregiver and Interview Forms, ranging from moderate to good in strength. However, t-tests showed a significantly lower Adaptive Behavior Composite, as well as Communication and Socialization domain scores for the Interview Form. Acceptability of the Vineland-3 was mixed, with both positive and negative feedback. Overall, caregivers found the measure to be relatively accurate, providing a comprehensive depiction of functioning. Caregivers who reported that the Vineland-3 did not accurately measure functioning, suggested possible reasons including it was too generalised, had too few response options, and did not capture fluctuations in functioning across time and environmental contexts.

Conclusions:
The Vineland-3 was found to have adequate reliability; however, the Interview Form specified a greater level of impairment than the Parent/Caregiver Form. Evaluation of acceptability revealed that most caregivers considered the Vineland-3 as an accurate and comprehensive measure of functioning.

431.128 (Poster) Reliability, Validity and Acceptability of the Pedi-CAT with ASD Scales for Australian Children and Youth on the Autism Spectrum  
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Background:

Autism is associated with diverse functional outcomes that cannot be described by diagnosis alone, thus, an assessment of functioning is recommended to inform the provision of supports. One measure currently used for this purpose in children and youth under 21 years of age is the PEDI-CAT(ASD); however, psychometric evidence is limited.

Objectives:

This study aimed to explore: 1/ Reliability (internal consistency, test-retest reliability, and parallel forms reliability with the original PEDI-CAT); 2/ Validity through comparison with the Vineland-3 (convergent validity) and the International Classification of Functioning, Disability and Health (ICF) Core Sets for Autism (content validity), and 3/ Acceptability from the perspective of caregivers.

Methods:

Caregivers of 134 children and youth on the autism spectrum participated in clinical assessments. Of these, 117 completed Assessment 1, involving the administration of the PEDI-CAT(ASD) and Vineland-3 Parent/Caregiver Form. Participants were randomised to either Assessment 2a or 2b, both involving the repeat administration of the PEDI-CAT(ASD), with Assessment 2b also involving administration of the Vineland-3 Interview Form. Additional recruitment to boost sample sizes resulted in another 17 participants being streamed directly into Assessment 2b. Caregivers of 47 children and youth completed Assessment 3, involving administration of the PEDI-CAT(Original) and/or a semi-structured interview exploring the acceptability of the PEDI-CAT(ASD). PEDI-CAT(ASD) content was compared to the ICF Core Sets for Autism to summarize areas of functioning assessed and relevance to autism.

Results:

The PEDI-CAT(ASD) demonstrated good to excellent internal consistency and test-retest reliability. Parallel forms reliability showed good to excellent correlations with the PEDI-CAT(Original), however, t-tests showed significantly higher Social/Cognitive scores for the ASD version. Concurrent validity results demonstrated significant correlations between the PEDI-CAT(ASD) and Vineland-3 core domains. The strength of these relationships ranged from poor to good with the Vineland-3 Parent/Caregiver Form, and poor to moderate with the Vineland-3 Interview Form. Content analysis of the full item bank revealed that the PEDI-CAT(ASD) covered 41% of the ICF Core Sets for Autism, 1% more than the PEDI-CAT(Original). Most were Activities and Participation codes; no Environmental Factors codes were represented. Just over half of the codes assigned to the PEDI-CAT(ASD) were represented in the ICF Core Sets for Autism, a 4% increase in relevance compared to the PEDI-CAT(Original). Content analysis of items administered to participants aged 0-5 years revealed that the median of 24% of the ICF Core Sets for Autism (0-5) was assessed. For participants aged 6-11 and 12-16 years, a median of 25% of the ICF Core Sets for Autism (6-16) was assessed. When compared against the full ICF Core Sets for Autism, median percentages were higher (28-30%), demonstrating greater relevance than the age specific ICF Core Sets for Autism. Feedback on the acceptability of the PEDI-CAT(ASD) was mixed in terms of accuracy, but overall, it was considered user-friendly and efficient.
Conclusions: The PEDI-CAT(ASD) was found to have adequate psychometric properties and acceptability as a measure of Activities and Participation codes. However, it lacks comprehensiveness and relevance when compared to the ICF Core Sets for Autism and has the potential to overestimate functioning.

Early Development (< 48 months)

Panel Chair: Alexandra Hendry, Department of Experimental Psychology, University of Oxford, Oxford, United Kingdom

Difficulties with Executive Functions (EFs) impact quality of life, mental health and social and economic outcomes amongst autistic people. Early intervention may be key to reducing EF difficulties amongst autistic people, but to do so effectively requires understanding when, in what sub-domains, and for whom, EF difficulties emerge. This panel draws together 4 programmes of research using advances in the early measurement of EF to examine EF-autism associations in samples enriched for high autism traits, either by virtue of family history (Presentations 1, 3 & 4), or screening of prodromal behaviours (Presentation 2). Presentations 1 and 2 examine how autism traits associate with day-to-day EF behaviours in infancy and toddlerhood captured through parent report. Presentations 2, 3 and 4 examine how autism traits associate with behavioural measures of EF captured in the lab. In combination, these studies indicate that EF difficulties are evident for toddlers with elevated autism traits by the 3rd year of life, and highlight key areas of vulnerability.

202.001 (Panel Discussion) Toddlers (but not infants) with Elevated Autistic Traits Show Lower Executive Function Scores
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Background:

Extensive research with children aged 3 years and above has demonstrated an association between autistic traits and difficulties with executive functions such as inhibitory control (the ability to stop or redirect a response), working memory (the ability to hold multiple items in mind, whilst manipulating those items) and cognitive flexibility (the ability to respond flexibly to a changing situation), particularly when these difficulties are captured via parent report of day-to-day behaviours. Due to a paucity of appropriate measures of everyday executive functions in infancy and toddlerhood, it is not clear whether associations between executive functions and autistic traits are evident prior to preschool age.

Objectives:

Using a recently-developed parent report measure of executive functions suitable for 9- to 36-month-olds, we aim to address the question of whether associations between autistic traits and day-to-day executive function ability are evident in infancy or toddlerhood, within a sample enriched for high variation in autistic traits (infants with a family history of autism or ADHD).

Methods:

136 UK parents of 9- to 37-month-olds with a family history of autism or ADHD contributed valid data about their child. Parents were recruited via a university babylab volunteer database, social media and the Prolific recruitment platform. Parents reported on their child’s autistic traits using the Autism Parent Screen for Infant (Bryson et al. 2006) (9- to 23-month-olds; n=85) or the Quantitative Checklist for Autism in Toddlers (Allison et al., 2008) (24- to 35-month-olds; n=51), and on their child’s executive function abilities using the Cognitive Executive Function (CEF) composite (23 items, α=.833) and Regulation scale (8 items, α=.904) of the Early Executive Questionnaire (all ages). Within each age group (i.e. infants/toddlers), linear regression was used to estimate the association between autistic traits and CEF score, after accounting for the linear effect of age. Hypotheses were pre-registered.

Results:

For 9- to 23-month-olds, the hypothesised associations between autistic traits and CEF scores (β=.118, p=.301) and between autistic traits and Regulation scores (β=-.126, p=.255) were not significant. As hypothesised, amongst 24- to 35-month-olds there was a significant negative association between autistic traits and CEF scores (β=-.808, p<.001) and between autistic traits and Regulation scores (β=-.595, p<.001); see Figs 1 and 2.

Conclusions:
Our results indicate that children with high levels of autistic traits may struggle, relative to their peers, with executive functions from as early as toddlerhood. These difficulties are observed in both the cognitive and regulatory aspects of executive function. Given the importance of executive functions for language development, as well as social, academic and mental health outcomes, these findings highlight the importance of providing early support in executive function development to toddlers displaying autistic traits.

Future research should consider whether executive function-autism associations may be detected even earlier than age 2 years when autistic traits are measured using trained observers rather than parent report.

202.002  (Panel Discussion) Early Cognitive Executive Functions in Toddlers with Prodromal ASD

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Background: The period between late infancy and early toddlerhood could be a sensitive period of the development of cognitive executive functions (EF), such as inhibitory control, flexibility and working memory. It has been suggested that in typical development, the ability to inhibit prepotent responses may be the first functions to emerge, already before the age of 12 months. Cognitive flexibility may be the latest EF to emerge. Existing evidence suggests that EF deficits may be present in autism spectrum disorder (ASD) before formal diagnosis, already before 3 years of age. It is less clear when and how EF deficits emerge and how EF unfold over time highlighting the importance of investigating EF skills in young children with prodromal ASD.

Objectives: The aim of the present study was to investigate cognitive executive functioning in early development at the prodromal stage of ASD. More precisely, we investigated association between early EF and ASD symptom severity.

Methods: Twenty-three participants between 13-30 months-of-age, screened with M-CHAT-R/F from the general population, have participated in the on-going Gaze@Toddler study. ADOS-2 for Toddlers was applied by professionals to evaluate ASD traits. Parents filled online the 31-item Early Executive Functions Questionnaire (EEFQ) suitable for 9-to 30-months old targeting cognitive and regulatory capabilities. From 31-items, 28 were questions concerning a wide range of activities from everyday life. Three items were behavioral games for parents to play with their children to elicit particular behavior. Four scales were calculated: Inhibition, Working memory, Flexibility and Regulation. In the present paper, statistical analyses were conducted for the EEFQ Cognitive Executive Function (CEF) factor including questionnaire items from Inhibition, Working memory and Flexibility (table 1). The internal consistency for CEF was evaluated with Cronbach’s alpha and the possible associations between total score of ADOS-2 and CEF and CEF subscales were evaluated with Pearson’s correlation coefficients.

Results: The internal consistency evaluated by the Cronbach’s alpha was for the CEF factor score .826 (table 1). Since the ADOS-2 score was positively correlated with age ($r(21)= .433, p=.039$), partial correlation was run to determine the relationship between ADOS-2 score, CEF factor, Inhibition, Working memory, and Flexibility whilst controlling for age. A moderate, negative partial correlation between Working memory and ADOS-2 score whilst controlling for age was observed ($r(20)=- .431, p=.045$) indicating that stronger ASD symptoms were associated with weaker working memory skills.

Conclusions: Among screened positive toddlers between 13-30 months, age was associated with prodromal ASD symptoms: the older the toddler was, the more severe prodromal ASD symptoms were observed. The internal consistency for CEF was good and equivalent to typically developing toddlers. When controlling the effect of age, the negative association between observed ASD symptoms and working memory skills evaluated by parents indicate that early EF deficits may be present already before the age of three in children with prodromal ASD. The small sample size means that the present result can only be considered preliminary. However, our on-going study will enable us to confirm these findings with a larger sample size.

202.003  (Panel Discussion) Associations between Autistic Traits and Executive Functions Amongst Two- and Three-Year-Olds with a Family History of Autism or ADHD


Background: Since autism and ADHD are highly heritable and overlapping, children with a family history of autism or ADHD are at elevated likelihood of showing autistic traits. Thus, research with this population affords the possibility of investigating how differences in cognitive development relate to autistic traits, early in development. Executive Functions (EF) enable us to work towards goals by coordinating thought and action and are of critical importance to social, academic and mental health outcomes. Autistic children and adults often experience EF difficulties but it is not known how early in development these difficulties emerge, due to a paucity of appropriate measures of early EF to date.
Objectives: We examine whether EF-autism associations are evident at age 2 or 3 years, in a sample at elevated likelihood of showing autistic traits, using a novel battery of EF measures.

Methods: 132 children with a first-degree relative with autism and/or ADHD completed an EF battery at age 2 (n=125), and 3 years (n=123). At age 2, the EF battery comprised an object-based inhibitory control task (‘Prohibition’), a touchscreen working memory game (‘Delayed Alternation’), and 3 eyetracking tasks indexing inhibitory control, working memory and cognitive control. At age 3, the EF battery additionally comprised a touchscreen inhibitory control game (‘GoNoGo’), a touchscreen cognitive flexibility game (‘Switch’), and an object-based working memory game (‘Spin-the-Pots’). Data processing of the eyetracking tasks is ongoing and will be included in the final presentation. Additionally, children were assessed with the Autism Diagnostic Observation Schedule–Second Edition, and parents reported on their child’s autistic traits using the Quantitative Checklist for Autism in Toddlers (age 2), and the Social Responsiveness Scale-Second Edition (age 3). Spearman rank correlations between autistic traits and performance on each EF task are presented. Missing data (due to the task not being attempted, or insufficient valid trials being completed) was excluded pairwise. In the full dataset, EF data will be reduced to latent factors to minimise multiple comparisons.

Results: Two-year-olds with high autistic traits showed lower inhibitory control on the Prohibition task compared with toddlers with low autistic traits, when traits were measured via behavioural assessment (\(r_s=-.269, p=.011\)) and via parent report (\(r_s=-.273, p=.007\)). No significant association between autistic traits and working memory was found at age 2. Three-year-olds with high parent-reported autistic traits showed lower working memory performance on Spin-the-Pots (\(r_s=-.337, p=.003\)). Similar associations were observed between parent-reported autistic traits and working memory (\(r_s=-.230, p=.052\)) and cognitive flexibility (\(r_s=-.299, p=.033\)) performance on two touchscreen tasks, but did not survive correction for multiple comparisons. Autistic traits were not significantly associated with inhibitory control at age 3; see Tables 1 and 2.

Conclusions: Autistic traits are linked to variation in behavioural markers of EF from as early as 2 years. EF difficulties appear first for inhibitory control, but are more evident for working memory by age 3. Planned latent-factor analysis with a more-comprehensive battery may reveal whether these findings are measure-specific, but these preliminary results indicate that toddlers already displaying autistic traits may benefit from early support with the development of EF.

202.004 (Panel Discussion) Executive Functions and Adaptive Behavior in 3 Year Olds: Associations to Autism and ADHD

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Background:

Difficulties with Executive Functions (EF) are common in children with autism and ADHD and have been suggested to be most impaired in children with co-occurring conditions. EFs are essential skills in order to function in everyday life, with associations to academic success, mental health and social relations (Diamond, 2002). However, a better understanding of both specific and shared neurocognitive markers would improve not only theory but also clinical practice particularly for children with co-occurring conditions. Given the high co-occurrence of autism and ADHD and the deficits in executive functioning commonly associated with ADHD it is important to disentangle autism and ADHD-specific contributions to the association of EF.

Objectives:

To investigate EF in relation to concurrent autism and ADHD in 3-year olds and if EF differs with respect to a family history of autism, a family history of autism and co-occurring ADHD, or with no family history of autism/ADHD. Moreover, we will also examine if specific EF components affect (moderate) the associations between autism vs ADHD-traits and adaptive functioning. However, the analyses which include adaptive functioning (e.g., moderation analyses) are only planned (pre-registered) and will be included at a later step.

Methods:

The sample consisted of 78 children at 36 months with a family history of autism (\(n=31\)), autism and co-occurring ADHD (\(n=27\)), and children with no family history of autism or ADHD (\(n=19\)). Adaptive behavior was assessed by VABS II. Executive functions were assessed by lab-tasks: day/night stroop, reversed categorization, beads, prohibition task, delay of gratification. Clinical best estimates of autism and ADHD-diagnosis assessed by clinical psychologists. Symptoms of autism and ADHD by ADOS-2 scores and ADHD-RS.

Results:

We found significant differences between groups based on family history in most of the EF-tasks, with lower scores for the FH-ASD and FH-ASD/ADHD groups. Children in the FH-ASD and FH-ASD/ADHD groups showed similar performance in Reversed categorization and the day/night Stroop, but slightly different performance in the Beads task (only children with FH-ASD had significantly lower scores...
Background: Atypical selective visual attention to social stimuli is a prominent feature of autism spectrum disorder (ASD; DSM-5-TR, 2022). One mechanism that contributes to selective attention in neurotypical individuals is reward value learning (RVL; Anderson, 2013; Gottlieb et al., 2014). Our group has demonstrated that unlike typical and developmentally-delayed controls, ASD preschoolers exhibit attenuated RVL in the social domain, indexed by lack of attentional bias for faces previously reinforced with social rewards (Wang et al., 2018, 2020). It remains unclear when RVL arises in infancy and whether it is related to social attention differences in infants with familial history of ASD (elevated-likelihood; EL infants). The present study investigates RVL in the social domain longitudinally, targeting EL infants and infants without familial history of ASD (low-likelihood; LL).

Objectives: Examine RVL in the social domain longitudinally at 4-, 6-, 8-, and 12-months of age. Data collection regarding developmental outcomes in this sample is ongoing.

Methods: Eighty-nine (66 LL, 23 EL) unique infants participated in at least one timepoint: 50 4-month-olds (M_{age}=4.27, SD=0.41, %Male=54.00), 49 6-month-olds (M_{age}=6.27, SD=0.51, %Male=59.18), 48 8-month-olds (M_{age}=8.35, SD=0.40, %Male=52.08), and 39 12-month-olds (M_{age}=12.27, SD=0.44, %Male=58.97). Participants viewed a gaze-contingent eye-tracking RVL task (Wang et al., 2020; see Fig. 1 for details) where specific faces were paired with a smile as a gaze-contingent reward (high-value; HV face) or remained neutral upon gaze (low-value; LV face). Visual preference for the HV face (HV dwell time/(HV dwell time+LV dwell time)) was computed before (baseline phase) and after (test phase) training. One-sample t-tests conducted at each age level compared mean HV preference to chance-level (0.5) at baseline and test phases (Fig. 2).

Results: Eye-tracking sessions with validation error $\leq 2^\circ$ and percent looking time $>20\%$ per trial were used for analysis. At baseline, 4-month-olds’ ($t(49)=0.29, p=0.773$), 6-month-olds’ ($t(47)=0.63, p=0.534$), 8-month-olds’ ($t(46)=1.19, p=0.238$), and 12-month-olds’ ($t(38)=-1.58, p=0.123$) mean HV preference was at chance-level, suggesting the absence of inherent stimulus biases (Fig. 2A). At test, 4-month-olds’ mean HV preference was at chance-level ($t(36)=-0.58, p=0.567$); however, 6-month-olds’ ($t(42)=3.98, p=0.001$), 8-month-olds’ ($t(42)=2.58, p=0.014$), and 12-month-olds’ ($t(33)=4.52, p=0.001$) mean HV preference were significantly above chance-level (Fig. 2B), indicating effects of training on visual selection in 6-12-month-old infants.

Conclusions: RVL in the social domain is robust by 6-months of age. Although prior studies have demonstrated infant RVL when non-social stimuli were paired with non-social or social rewards (Tummeltshammer et al., 2014, 2019), this is the first study to investigate RVL longitudinally and use an ecologically-valid paradigm, as both the stimuli and reward are social, capturing an essential, real-world skill. Considering RVL’s crucial role in selecting relevant stimuli for processing, RVL may be a prerequisite for the development of joint attention and social referencing, which emerge at 9-12-months of age (Mundy et al., 2007; Walden & Ogan, 1988) and are impaired in ASD. This longitudinal study is ongoing: we plan to evaluate associations between developmental trajectories of RVL in the social domain and developmental outcomes in EL and LL infants for the INSAR 2023 Annual meeting.
Background: Preferential orienting and looking at faces are present at birth and have been linked to atypical heritable neurodevelopmental conditions such as autism. According to one theory, face looking draws on two distinct neural processes: a subcortical one that promotes initial and fast orienting to faces appearing in the periphery, and a cortical route linked to top-down and sustained attention to the attended face (Johnson, Senju, and Tomalski, 2015). So far, no study with infants has probed whether face looking, when in competition with other objects, is a heritable phenotype, or whether orienting to faces versus sustained looking at faces have shared or distinct genetic etiologies.

Objectives: We investigated the contribution of genetic and environmental factors to individual differences in early life orienting and preference for faces (versus non-facial objects), and whether there were shared or distinct genetic etiologies between these measures. We also tested their associations with later developmental outcomes and common genetic variants (using genome-wide polygenic scores) associated with neurodevelopmental (autism spectrum disorder and attention deficit hyperactivity disorder) and mental health (bipolar disorder, major depressive disorder, and schizophrenia) conditions.

Methods: Our study included 536 infant twins assessed at 5 months of age (293 monozygotic and 243 dizygotic pairs) in the lab, using a Tobii TX300 eye-tracker to record attention to faces in two ways: initial orienting to faces at the start of the trial (thought to reflect subcortical processing) and sustained face preference throughout the trial (thought to reflect emerging attention control). We used 6 face pop-out displays of 20 seconds each, each consisting of static images of a face and 4 non-face competitors (including a ‘noise’ stimulus generated from the same face, a mobile phone, a bird, and a car) – see an example in Figure 1 Zygosity and GPSs were estimated based on DNA samples. Later developmental outcomes were assessed using standardized parent-rated questionnaires. The analysis plan for this study was pre-registered in OSF (https://doi.org/10.17605/OSF.IO/5FBVK).

Results: We showed that face looking was heritable, both face preference (the maintenance of attention to the face as the preferred target of attention, \( h^2 = .46, CI: .33-.57 \)) and face capture (the orienting to the face as the first target of attention, \( h^2 = .19, CI: .04-.33 \)). Face capture was not associated with later developmental outcomes, but higher face preference was associated with higher parental ratings of verbal competence in toddlerhood (\( b = 0.14, p = .014 \)). The phenotypic association between face capture and face preference (\( r_{pm} = .30 \)) was mostly explained by shared genetic factors – see Figure 2.

Conclusions: This study shows that individual differences in young infants’ selection of perceptual input – social versus non-social – are heritable, providing a new developmental perspective on gene-environment interplay occurring at the level of eye movements.

Background: Over the first year of life, infants engaged with infant-directed speech (ID-speech) gradually transition their gaze from the eyes to the mouth of the caregiver, as the mouth contains audio-visual cues that support language development (Tenenbaum 2015). Previous research has identified a positive relationship between mouth-looking and language outcomes in typically developing (TD) infants, but not siblings with an elevated likelihood of developing autism (Chawarska et al. 2022). Infant-directed song (ID-song) extends the features of ID-speech through increased rhythmic predictability, audio-visual synchrony, and smiling, as well as reduced tempo, capturing the attention of TD and ASD infants for longer durations than ID-speech (Macari et al. 2020). However, how TD and ASD infants allocate attention to the face during ID-song and ID-speech in relationship with language outcomes and feature sensitivity is unknown.

Objectives: Examine visual fixations to the mouth over the first year of life across ID-speech and ID-song conditions in TD and ASD infants with varying language outcomes.

Methods: TD infants (n=163) and ASD infants (n=64) were eye-tracked at 3, 4, 5, 6, 9, and 12 months of age while watching videos of caregivers singing (ID-song) or speaking (ID-speech). We quantified mouth-looking the proportion of face-looking time (PFLT) spent on the caregiver’s mouth (PFLT-mouth). Infants’ expressive language (EL) skills were assessed at 24 months using the Mullen Scales of Early
Learning (MSEL). We used a median split to separate ASD infants with higher (mean EL T=55.4 (9.6)) versus lower (EL T=31.9 (7.2)) EL outcomes. (TD infants EL T=57.4 (11.5)). Linear mixed models assessed changes in mouth-looking based on age, diagnostic group (TD, ASD-HighEL, ASD-LowEL), and condition (ID-speech, ID-song). Follow-up mixed models examined which stimuli features were associated with mouth-looking in each group.

**Results:** Across diagnostic groups, mouth-looking was higher in ID-song than ID-speech ($\beta = 0.099, p < 0.001$) and increased with age ($\beta = 0.075, p < 0.001$). PFLT-mouth increased at a faster rate in ID-song than ID-speech ($\beta = 0.032, p < 0.001$). When considering language outcomes, ASD-HighEL increased mouth-looking over the first year at a slower rate than TD or ASD-LowEL infants ($\beta$'s > 0.06, p's < 0.05), who exhibited more similar mouth-looking trajectories (Figure 1). However, which features drove mouth-looking differed across the three groups. Greater mouth-looking was predicted by slower stimuli tempo and increased rhythmic predictability, smiling, and mouth audiovisual synchrony in TD; by tempo and rhythm in ASD-HighEL; and by tempo in ASD-LowEL.

**Conclusions:** Over the first year of life, infants with and without ASD allocate more facial visual attention to the mouth, though this effect is attenuated in ASD-HighEL infants. This effect is greater during ID-song compared to ID-speech potentially due to features associated with song. The differing sensitivity to stimuli cues associated with mouth-looking in ASD and TD infants suggests differing processes regarding whether and how mouth-looking adaptively supports expressive language development across diagnostic groups. Individual differences in feature sensitivity may impact response to early language intervention and suggest differing mechanistic processes to be targeted.

**306.004 (Oral) Language, Visual Attention to Faces and Temporal Frequency: A Prospective Longitudinal Study of Infants with a Family History of Autism and ADHD**

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**Background:**
Neurodevelopmental conditions like autism and attention deficit hyperactivity disorder (ADHD) are diagnosed in early childhood and frequently co-occur. It is important to understand the early mechanisms that could contribute to later difficulties in these neurodevelopmental conditions through prospective studies. Throughout infancy, there are developmental changes in infant’s face-scanning patterns, which shapes and reflects their processing of social information like language. Another important component in early learning is how temporal structure of events influences attention. Syllabic speech occurs at 6Hz frequency, but it is unclear how mouths moving at different frequencies affects visual attention. Here, we explore looking patterns to faces at various temporal frequencies, in infants with and without autistic and/or ADHD first-degree relatives.

**Objectives:**
To investigate attention to faces, temporal structure (i.e. information presented at different frequencies), and language outcomes in infants with and without a family history of autism and/or ADHD.

**Methods:**
This prospective study included 161 infants (70 females) from the Studying Autism and ADHD Risks Study (STAARS); 29 typical-likelihood (TL) controls, 80 elevated-likelihood (EL) Autism, 31 EL-ADHD and 21 EL-Autism+ADHD. At 5-10- and 14-month timepoints, infants completed an eye-tracking paradigm (‘Frequency Task’). Three 10-second videos of face pairs were presented to the infants (Figure 1A). Each video flashed at low, mid or high frequencies, to show the mouth opening and closing in every other frame. An eye-mouth index (EMI; see Figure 1B) was calculated as: upper-face-looking time/(upper-face-looking time + lower-face-looking time).

Additionally, infant's language skills were assessed from 5- to 36-months using the Mullen Scales of Early Learning (MSEL). We used a median split to separate ASD infants with higher (mean EL T=55.4 (9.6)) versus lower (EL T=31.9 (7.2)) EL outcomes. (TD infants EL T=57.4 (11.5)). Linear mixed models assessed changes in mouth-looking based on age, diagnostic group (TD, ASD-HighEL, ASD-LowEL), and condition (ID-speech, ID-song). Follow-up mixed models examined which stimuli features were associated with mouth-looking in each group.

**Results:**
While EMI decreased with age ($\beta = -1.07, z(1939) = -8.88, p < .001$), temporal frequency did not affect eye-mouth looking over time ($ps > .22$). There was a marginally significant interaction between familial likelihood status and EMI ($\beta = -1.15, z(1939) = -1.93, p = .054$). Infants with EL for autism had a larger EMI compared to infants at TL for autism, but only when they were also TL for ADHD (OR = 0.50, SE = 0.18, p = .055); see Figure 2. At 14-months, infants who had acquired first words looked more at the mouth than infants without first words ($\beta = -0.14, r(58.43) = -2.47, p = .016$). However, language skills at 36-months did not associate with developmental changes in eye-mouth looking ($ps > .14$).

**Conclusions:**
Infants showed no preference for stimuli presented at the frequency of syllabic speech. The primary developmental shift in visual attention from looking at the eyes towards the mouth was consistent with emerging expressive language. Eye-mouth looking in infants with EL or
TL for autism varied depending on ADHD likelihood status. Nevertheless, individual differences in infant’s face scanning patterns did not associate with later language outcomes. This work adds to the existing knowledge by highlighting similarities and differences in visual attention and language development in autism and co-occurring conditions like ADHD. Future work will explore associations between EMI, language and autism outcomes in these children.

**ORAL SESSION — EARLY DEVELOPMENT (< 48 MONTHS)**

**322 - Early Emerging Neurodevelopmental Differences in Autism**

*Moderator: Ilan Dinstein, Psychology Department, Ben Gurion University, Beer Sheva, Israel*

**322.001 (Oral)** Using the Baby Connectome Project to Inform Early Autism – Explorations of Sleep, Brain Anatomy, and Social Communication

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**Background:** Using a developmental psychopathology perspective to inform early autism social communication development, this study assesses a typically developing sample with particular attention to two areas of noted interest in autism: sleep problems and extra-axial cerebrospinal fluid (EA-CSF). The developmental correlates of early, consistent sleep disturbance are well-documented across multiple domains, including complex behaviors such as social communication. Recent studies (Shen et al., 2017; 2018) highlight the potential role of elevated EA-CSF in individuals with autism and sleep problems; however, the nature of these developmental relations are not well understood.

**Objectives:** To inform our understanding of the longitudinal associations between early sleep problems, EA-CSF volumes, and social communication development in the first two years.

**Methods:** Data from the Baby Connectome Project (n = 318), a hybrid longitudinal cohort study documenting typical neurodevelopment in the first five years (Howell et al., 2019), was utilized for this study. See Table 1 for sample and data descriptive information. Based on parent reports of sleep in the first two years, children were classified into two groups: (1) consistent sleep problems (n = 35; 11%) and (2) inconsistent or no sleep problems (n = 283; 89%), Social communication competence at 24 months was indexed with the Mullen Scales of Early Learning, Video-Referenced Rating of Reciprocal Social Behavior, and Vineland Adaptive Behavior Scales, 2nd Edition. Volumetric EA-CSF and the ratio of EA-CSF to total cerebral volume (TCV) at 24 months were measured via T1- and T2-weighted MRI.

**Results:** Using path analysis (Figure 1), higher EA-CSF/TCV ratios were associated with lower receptive language skills and reciprocal social behavior at 24 months. Contrary to our hypotheses, robust connections between consistent sleep problems and later brain anatomy (EA-CSF/TCV ratios) and social communication were not apparent.

**Conclusions:** Consistent with previous work in autism, EA-CSF/TCV ratios were associated with aspects of social communication. This study builds on a line of work that highlights EA-CSF/TCV ratio as a developmentally meaningful anatomical index that can inform typical and atypical social communication development. Inconsistent with previous research, sleep problems were not clearly connected to the indices of interest; however, this may reflect the low levels of sleep problems present in this sample. Further research examining longitudinal trajectories and objective measures of sleep is needed to address the roles of brain morphology and sleep on social communication development.

**References**


**322.002 (Oral)** Differences in Speech-like Vocalizations and Word Production Among Autistic, Neurotypical, and Premature Toddlers
Theta-Beta Ratios Are Altered in Infants with a Family History of Autism Spectrum Disorder and/or Attention Deficit Hyperactivity Disorder, but Not in Infants with NF1

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Background:
Neurodevelopmental conditions such as Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD) are typically diagnosed in early/middle childhood through a combination of clinical interviews and observer-reports. The genetic factors that predispose an individual towards these highly heritable conditions likely act predominately prenatally, affecting brain development for years before the consolidation of the full clinical phenotype (Faraone & Larsson, 2019). Identifying the brain changes that precede the onset of behavioural symptoms could help with earlier identification of individuals who require additional support, and could provide useful outcome measures for early interventions.

One such neural change is the balance of theta and higher frequency oscillations (typically theta-beta ratio; TBR). Previous research has shown that a subset of children with ADHD show differences in TBR and its use as a prognostic indicator has been suggested (Arns et al.,...
Atypical Neural Responses to Language at 9 Months of Age Predict Delayed Language Trajectories in Infants at High and Low Likelihood for Autism

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Background: Language delays and impairments are common in autism spectrum disorder (ASD). Toddlers with a diagnosis (Redcay & Courchesne, 2008; Lombardo et al., 2015) and infants at high familial likelihood (HL) for ASD (Blasi et al., 2015) display atypical neural responses to speech, suggesting that the neural substrates of ASD-associated language delay are present well before behavioral signs can be detected. However, HL infants are a clinically and behaviorally heterogeneous population, which hinders efforts in identifying early biomarkers of ASD. Behavior-based stratification has proven useful in parsing the heterogeneity of HL samples (Longard et al., 2017; Okada et al., 2022), but has not yet been applied to investigate atypical brain activity associated with native/non-native language processing in infancy.

Objectives: To investigate the neural antecedents of aberrant language development in a sample of infants at varying familial likelihood for ASD using a data-driven clustering approach.

Methods: Infants at high (HL) and low (LL) familial likelihood for ASD were recruited as part of a longitudinal study of ASD biomarkers. Receptive language skills were periodically assessed (6, 9, 12, 18, 36 months) with the Mullen Scales of Early Learning (MSEL). Using the KmL package in R, infants who completed at least two MSEL assessments, with at least one conducted at 12 months or later (N=135), were clustered into three groups (Typical, Late-Blooming, and Atypical) based on their receptive language trajectories. At 9 months of age, a subset of participants successfully completed a stimulus-evoked fMRI paradigm in which alternating blocks of their native language (English) and a novel language (Japanese) were presented during natural sleep. After MRI quality control, the Typical, Late-Blooming, and Atypical group included 23, 18 and 8 infants, respectively. The fMRI scans were preprocessed and analyzed with FSL; differences in neural activity were evaluated across groups and language conditions.

Results: The Typical and Late-Blooming groups showed robust activation in classical fronto-temporal language networks in response to both languages. Moreover, these groups both showed extensive activity in additional frontal and occipital areas for the non-native language, with the Typical group also activating additional parietal association areas implicated in language. In contrast, the Declining group displayed considerably weaker neural activity in response to either language and, importantly showed no significant neural discrimination between languages. Finally, the extent of activation for Japanese vs. English was significantly higher in the Typical group than in the Late-Blooming group, suggesting a stronger novelty response for the non-native language.

Conclusions: This is the first demonstration that alterations in TBR are present in infants with a family history of ASD, extending the findings of Begum Ali, Goodwin et al. (2022), who found differences in TBR at 10 months only in infants with an elevated likelihood of ADHD. Interestingly, our NF1 cohort showed no alterations in TBR. We will discuss the developmental trajectories of TBR alterations and the implications for each neurodevelopmental condition.
with stronger responses to the novel/non-native language. The hypoactivation observed in the Atypical group for both native and non-native languages may reflect diminished salience of and/or attention to human speech, while the lack of neural differentiation between the two languages in this group suggests limited uptake of their native language well before overt autism-related delays can be observed.

**POSTER SESSION — EARLY DEVELOPMENT (< 48 MONTHS)**

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<td><strong>413.185 (Poster) A Developmental Perspective on Autism: Delayed and Remaining Early Typical Behaviours in Autism</strong>&lt;br&gt; <em>E. Nilsson Jobs, Center for Neurodevelopmental Disorders at Karolinska Institutet (KIND), Department of Women’s and Children’s Health, Karolinska Institutet, Stockholm, Sweden</em></td>
<td><strong>413.186 (Poster) An Exploratory Study into Cascading Effects of Sensory Processing on Language through Play in Young Children at Elevated Likelihood for Autism</strong>&lt;br&gt; <em>F. Moerman¹, P. Warreyn¹, I. Noens¹, J. Steyaert¹, L. van Esch¹, L. M. de Vries¹, M. Madarevic¹, J. Segers¹, T. Van Lierde² and H. Roeyers¹, (1)Department of Experimental-Clinical and Health Psychology, Ghent University, Ghent, Belgium, (2)Department of Experimental-Clinical and Health Psychology, Ghent University, Ghent, BELGIUM, (3)Parenting and Special Education Research Unit, Faculty of Educational Sciences, KU Leuven, Leuven, Belgium, (4)Child Psychiatry, UPC-KU Leuven, Leuven, Belgium, (5)Parenting and Special Education Research Unit, KU Leuven, Leuven, Belgium, (6)Center for Developmental Psychiatry, KU Leuven / UZ Leuven, Leuven, Belgium, (7)Ghent University, Ghent, Belgium</em></td>
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Background: DSM-5 describes several behaviours within each domain and criteria for autism. The descriptions range from motor-, sensory-, perceptual-, language-, and socio-communicative behaviours to social cognition, intense interests and insistence on sameness. The developmental perspective on autism describes the condition as a delay of typical milestones on the one hand and, as early typical restricted and repetitive behaviours remaining instead of attenuating, on the other. If proven right, this perspective could open up for a new understanding of autism and the impact autism has on developmental trajectories. Moreover, interventions could be adapted to behaviours and milestones reached. However, the developmental perspective has not been fully evaluated in relation to descriptions in DSM-5 and gold-standard protocols. As yet, we do not really know if all autistic behaviours can be associated with typical development. Also, according to this perspective, milestones in autism emerge with other timing or rates than in typical development. To evaluate this, we need to make sure that we have good insights into the timing and rates of typical development. For the social domain, we often have a fairly good estimate about the emergence of different pro-social behaviours in typical development, even if not in detail. Our knowledge of milestones of restricted and repetitive behaviour in typical development is however often very limited, most likely because these behaviours have not been looked upon as part of typical development.

Objectives: The first aim was to search for research studies, indicating early milestones being delayed in autism. The second aim was to investigate if the restricted and repetitive behaviours, described in DSM-5 could be associated with behaviours in typical development. The third aim was to explore the feasibility to map early typical behaviours and milestones which are relevant to autism onto a developmental timeline.

Methods: As a first step, inventory of clinical charts and descriptions of early typical behaviours and milestones was made and compared with autistic behaviours according to the DSM-5. As a second step, search for research findings for more in-depth descriptions of typical developmental behaviours and trajectories, relevant for autism was performed.

Results: Findings indicated that typical socio-communicative behaviours are present but delayed in many autistic individuals. Moreover, restricted and repetitive behaviours found in autism, are also found in typical development, often remaining for a longer time in autism.

Conclusions: Findings indicate strong support for the developmental perspective of autism. Typical socio-communicative and restricted and repetitive behaviours can be mapped onto a time-line, easy to compare with the presence and absence of autistic behaviours.

Background: Language development is highly variable in autistic children and children at elevated likelihood (EL) for autism. There is some evidence suggesting that atypical sensory processing (SP) may trigger a cascade of direct and indirect effects on language development (e.g., Feldman et al., 2021). Atypical SP may change how children play and interact with objects, which may influence language development. This cascade has however not yet been studied.

Objectives: Using a mediation model of development, the current study investigates whether SP at 10 months influences language at 24 months through object play at 14 months in EL-children (younger siblings of autistic children and children born before 30 gestational weeks, N=112).
Methods: As part of a prospective longitudinal study, parents rated SP of their 10-month-old child on three domains (hyporesponsiveness, sensory seeking and hyperresponsiveness) using the Infant/Toddler Sensory Profile (ITSP), wherein lower scores were indicative of increased presence of the behaviors of interest. Scaled scores of the subscale Object Use of the Communication and Symbolic Behavior Scales Developmental Profile Caregiver Questionnaire (CSBS-DP) were used to assess play at 14 months. Parent-reported language was assessed using the short-form version of the MacArthur Communicative Development Inventories (MCDI) at 24 months. Three multiple regression models were conducted. Percentile-based bootstrap intervals were calculated for testing indirect effects using the “lavaan” R package.

Results: Three domains of SP accounted for 12.09% of the variance in play ($F(3,108) = 4.95, p = .003$). SP and play accounted together for 13.57% of the variance in language ($F(4,99) = 3.89, p = .006$). The total effect, representing the relationship between three domains of SP and language without the mediation of play, was not significant. The relationship between sensory seeking and language was fully mediated by play (bootstrapped unstandardized indirect effect 95%CI (-0.060: -0.006). For each additional point on the sensory seeking domain, participants scored .11 points lower on the CSBS-DP ($p = .006$), which in turn led to a decrease in language: per decreasing point on the CSBS-DP, MCDI scores decreased with 22.17% ($p = .001$). Although the effect of hyporesponsiveness on play was significant ($B = .11, t = 2.11, p = .03$), the (in)direct effects of hyporesponsiveness on language were not. No significant (in)direct effects of hyperresponsiveness on language were found.

Conclusions: This prospective study provides novel information on the association between SP and language through play in EL-children. No direct effects between early hyporesponsiveness, sensory seeking and hyperresponsiveness and later language were found. Contrary to results found in older children with (EL for) autism (e.g., Watson et al., 2011), parents who reported more sensory seeking behavior in their 10-month-old child, reported better play skills at 14 months, which was associated with better parent-reported language at 24 months. Our results support previous research showing that early play is related to later language, which emphasizes that play opportunities are indeed meaningful and important childhood experiences. More advanced play skills may be protective, amongst other variables, for language difficulties especially when children show little interest to perpetuate or intensify a sensory experience before their first birthday.

413.187 (Poster) Association between Cumulative Psychosocial Adversity in the Family and Neurodevelopmental Disorders: A Family-Based Cohort Study

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Background: Cumulative exposure to psychosocial adversity at an early age has been shown to be a risk factor for developing neurodevelopmental disorders, such as attention-deficit hyperactivity disorder (ADHD) and autism. However, few studies have investigated the effect of cumulative psychosocial adversity on neurodevelopmental outcomes and the role of unmeasured confounding. A scale for psychosocial adversity created by Rutter et al. consists of several factors: severe marital discord, low socioeconomic status, large family size, paternal criminality, maternal mental disorder, and foster care placement. Rutter et al. found that aggregation of those factors increases the risk for ADHD. Exposure to psychosocial adversity in early childhood is also associated with increased risk of autism. One major limitation of previous studies of psychosocial adversity and neurodevelopmental disorders is that most were unable to adjust for unmeasured familial (i.e., genetic and shared environmental factors) confounding.

Objectives: The aim of this study is to investigate the association between cumulative psychosocial adversity during the first year of life in the family and neurodevelopmental disorders in offspring, using family-based study designs to control for unmeasured confounding, and to assess if psychosocial adversity is specifically associated with ADHD or autism.

Methods: We used a population-based cohort of 1,877,901 individuals born in Sweden between 1990 and 2009. Participants were followed from the age of 3. Based on the information on 7 registers we created a cumulative index based on 7 psychosocial adversity factors and identified the diagnoses of ADHD and autism. We used Cox regression to estimate the hazard ratios (HRs) relating neurodevelopmental disorders to cumulative psychosocial adversity. To address familial confounding, the analyses were repeated in groups of relatives of different kinship: siblings, half siblings and cousins.

Results: A dose-response relationship was observed between cumulative exposure to psychosocial adversity and ADHD at a general population level (covariate adjusted HRs with 95% confidence intervals ranged from 1.55 [one adversity; 1.52 - 1.58] to 2.61 [≥4 adversities; 1.95 - 3.49]). No clear dose-response relation was seen for autism (covariate adjusted HRs ranged from 1.06 [1.60 - 1.87] to 1.34 [1.30 - 1.38]). HRs of ADHD and autism decreased with increasing level of kinship in the analysis of groups of relatives. Sex stratified analysis showed that boys and girls had similar risks of developing ADHD with the dose-dependent effect related to experiencing cumulative psychosocial adversity while girls had a higher risk of being diagnosed with autism compared to boys.

Conclusions: Cumulative exposure to psychosocial adversity was associated with both ADHD and autism in the general population. However, the association was attenuated towards the null with increasing level of genetic and environmental sharing, indicating that the association was partly explained by unmeasured familial confounding. This highlights the need for using family-based designs in studies of risk factors for neurodevelopmental disorders.
Background: Anxiety is one of the most common co-occurring conditions in youth with autism spectrum disorder (ASD; Leyfer et al., 2006). Both conditions share similar behavioral presentations, especially insist on sameness (IS), and both are associated with early temperament (Buss et al., 2013; Russel et al., 2019). Although behavioral inhibition (BI; fearful temperament) represents one of the most robust predictors of childhood anxiety, the relationship between infancy fearfulness and school-age anxiety among younger siblings of autistic children and typically developing children is found to be unique in children with ASD and not present in others (Degnan et al., 2010; Lasch et al., in preparation). The finding suggested that there are possible mechanisms linking autistic presentation and anxiety behaviors early in development; however, the behavioral manifestation and underlying mechanisms remain unclear.

Objectives: This study aims to examine the relationships between early temperament (measured by the Infant Behavior Questionnaire-Revised, IBQ-R, at 12-month-old), higher-order repetitive behavior (Repetitive Behavior Scale-Revised, RBS-R, at 24-month-old), and internalizing symptoms in toddlerhood (Child Behavior Checklist, CBCL, at 24- or 36-month-old).

Methods: Infants with higher autism likelihood (HL, having an older sibling diagnosed with autism; N = 62, 58% male) and lower likelihood (LL, no family history of autism in first-degree relatives; N = 39, 56% male) were examined at 12, 24, and/or 36 months of age. Caregivers completed IBQ-R (Approach and Fear), RBS-R (Ritualistic and Sameness Behavior), and CBCL 1.5 to 5 Years Form (Internalizing Problem) at 12-month, 24-month, and/or 36-month visits, respectively. Generalized mixed models were first used to examine the association between early temperament, higher-order repetitive behavior, and internalizing symptoms, controlling sex and familial likelihood. Causal Mediation Analyses were implemented next, bootstrapping with 5000 resamples to generate more reliable, robust results.

Results: Results suggested that early ritualistic behavior (β = 1.555, p < .05) and sameness behavior (β = 2.264, p < .001) were associated with later internalizing symptoms after controlling for familial likelihood and sex and considering early temperament. Causal mediation analyses revealed that the effect of early temperament on internalizing symptoms was fully mediated by insist on sameness. Specifically, the effect of infancy approach on internalizing symptoms (b = -4.759, p < .001) was fully mediated by sameness behavior, accounted for 47.7% of the total effect (95% CI [0.162 – 1.515]); the effect of fear on internalizing symptoms (b = 3.093, p < .001) was also fully mediated by sameness behavior, accounted for 48.5% of the total effect (95% CI [0.095 – 1.098]); the effect of infancy approach on internalizing symptoms (b = -4.759, p < .001) was fully mediated by sameness behavior, accounted for 47.7% of the total effect (95% CI [0.162 – 1.515]). Other restricted, repetitive behaviors, including compulsive behavior, restricted interests, self-injurious behavior, and stereotypic behavior, did not mediate the relationships between early temperament and toddlerhood internalizing symptoms.

Conclusions: The association between early temperament and later internalizing presentation was fully mediated by insist on sameness, suggesting IS may play a critical role in the development of anxiety. Elevated and persistent IS behaviors may be the main barrier that impedes the emergence of more developmentally appropriate modes of self-regulation, which result in elevated internalizing symptoms.

Background: Evidence suggests an interlink between sensory challenges and anxiety. Sensory related difficulties are known to be core of autism symptoms and earlier models link anxiety to Restrictive Repetitive Behaviours (RRB). A previous study with infants at elevated likelihood of autism indicated that infant anxiety and perceptual sensitivity traits were related both to later RRB and to later Social Communication Interaction (SCI) traits. We attempt to replicate this model in a separate cohort and examine whether separating hypersensitivity and hyposensitivity may show greater specificity, as it may be more attuned to determine different mechanisms that underpin sensory processing.

Objectives: This study aims to examine the associations between infant sensory hypersensitivity and anxiety and three-year autism characteristics.

Methods: Caregivers completed IBQ-R (Approach and Fear), RBS-R (Ritualistic and Sameness Behavior), and CBCL 1.5 to 5 Years Form (Internalizing Problem) at 12-month, 24-month, and/or 36-month visits, respectively. Generalized mixed models were first used to examine the association between early temperament, higher-order repetitive behavior, and internalizing symptoms, controlling sex and familial likelihood. Causal Mediation Analyses were implemented next, bootstrapping with 5000 resamples to generate more reliable, robust results.

Results: Results suggested that early ritualistic behavior (β = 1.555, p < .05) and sameness behavior (β = 2.264, p < .001) were associated with later internalizing symptoms after controlling for familial likelihood and sex and considering early temperament. Causal mediation analyses revealed that the effect of early temperament on internalizing symptoms was fully mediated by insist on sameness. Specifically, the effect of infancy approach on internalizing symptoms (b = -4.759, p < .001) was fully mediated by sameness behavior, accounted for 47.7% of the total effect (95% CI [0.162 – 1.515]); the effect of fear on internalizing symptoms (b = 3.093, p < .001) was also fully mediated by sameness behavior, accounted for 48.5% of the total effect (95% CI [0.095 – 1.098]); the effect of infancy approach on internalizing symptoms (b = -4.759, p < .001) was fully mediated by sameness behavior, accounted for 47.7% of the total effect (95% CI [0.162 – 1.515]). Other restricted, repetitive behaviors, including compulsive behavior, restricted interests, self-injurious behavior, and stereotypic behavior, did not mediate the relationships between early temperament and toddlerhood internalizing symptoms.

Conclusions: The association between early temperament and later internalizing presentation was fully mediated by insist on sameness, suggesting IS may play a critical role in the development of anxiety. Elevated and persistent IS behaviors may be the main barrier that impedes the emergence of more developmentally appropriate modes of self-regulation, which result in elevated internalizing symptoms.
Objectives:

The study aims to: 1) replicate the association between infant anxiety and perceptual sensitivity and later autism traits in an independent sample. 2) examine longitudinal associations between infant anxiety and hypersensitivity and hyposensitivity and later RRB and SCI symptoms.

Methods:

As part of the Studying Autism and ADHD Risks (STAARS), 161 infant-siblings participated in a longitudinal study. All participants had at least one older-sibling with a diagnosis of autism (elevated-likelihood-Autism (EL-ASD; N=80)), or first degree relative with Attention Deficit Hyperactivity Disorder (ADHD) (elevated-likelihood-ADHD (EL-ADHD; N=31)) or both (elevated-likelihood-autism&ADHD (EL-ASD/ADHD; N=21)). All typical-likelihood (TL) participants (N=29) had no known immediate family members with a diagnosis of autism or ADHD. Parents rated infant’s traits of early anxiety and perceptual sensitivity using the Infant Behavior Questionnaire at 10 and 14-months, and the Early Childhood Behavioral Questionnaire at 24-months. The Infant Toddler Sensory Profile (ITSP) was used to separate hyposensitivity and hypersensitivity at all timepoints. RRB and SCI were assessed using subscales of the parent-rated Social Responsiveness Scale at 36-months. Structural equation models tested 1) predictive pathways from fear (infant anxiety) and perceptual sensitivity at 10-24-months, 2) bidirectional pathways between fear, hyposensitivity, and hypersensitivity quadrants of ITSP between 10-24-months, 3) Cross-lag models tested directionality of the pathways from fear and hypo/hypersensitivity at 10, 14 and 24 months, and RRB and SCI at 36 months.

Results:

Replication analysis provided a moderate fit along with within domain continuity for both fear and perceptual sensitivity between 10-14 and 14-24-months as seen before. The cross-lagged model with ITSP indicated within domain continuity to next timepoint for fear, hyposensitivity and hypersensitivity. Higher levels of hypersensitivity at 14 months were associated with both fear and hyposensitivity at 24 months. Increased hypersensitivity at 14 and 24 months were associated with higher levels of SCI at 36 months, and hypersensitivity at 24 months associated with RRB at 36 months, but fear was not.

Conclusions:

Our findings did not replicate the associations between early anxiety and perceptual sensitivity to later RRB and SCI. The novel model with the ITSP found that developmental continuity of traits and association of infant anxiety was specific to hypersensitivity compared to hyposensitivity. Hypersensitivity also related to later RRB and SCI. Our findings indicate that hypersensitivity plays an important role in development of later autism characteristics.

413.190 (Poster) Behavioral Differences between Infants at Community and Elevated Risk for Autism during a Contingency Learning Paradigm

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Background: Infants having a family history of autism are at elevated risk for autism (ER). Based on current literature, infants at ER and later diagnosed with autism display delayed motor development, atypical visual behaviors, and difficulties with motor control (Johnson et al. 2015). Despite these descriptions, we do not know if infants at ER have difficulties learning or executing motor skills. A better understanding of motor skill acquisition and execution will aid in developing behavioral interventions.

Objectives: The aim of this study was to determine and describe the motor behavioral differences between infants at community risk (CR) and ER for autism during a contingency learning paradigm (CLP).

Methods: To date, 21 full-term infants (6-9 months of age) at CR (n=14, 6 male) or ER (n=7, 5 male) participated in a CLP. An infant-sized humanoid socially assistive robot provided reinforcement by clapping and laughing when the infant produced a right leg movement with an acceleration ≥ 3.0 m/s² (GIF 1). The CLP contained a 2-minute baseline (no reinforcement), 8-minute contingency (robot reinforcement), and 2-minute extinction (no reinforcement). The infant’s limb movements were captured by wearable sensors (Opal) and concurrent gaze by a head-mounted eye tracker (Positive Science). The number of robot activations during each 2-minute block of the contingency phase were counted, as well as the number of times the infant would have activated the robot during baseline. An infant was classified as a performer if they activated the robot 1.5 times more during any block of the contingency phase than during baseline. Using a frame-by-frame analysis, two assessors determined the start and end of each gaze centered on the robot to estimate look duration. Assessors were
Results: Preliminary results showed that fewer infants at ER were classified as performers (ER = 29%, CR = 43%, Table 1). However, infants at ER tended to produce more robot activations during the contingency phase (M±SD; ER=92±28, CR=79±37). Average look duration appeared to be similar; ER (N=2) (301 and 306 sec) and CR (M±SD, N=6) (279±40 sec).

Conclusions: Our preliminary data suggest that fewer infants at ER may increase their limb movements in response to a reinforcement than infants at CR for autism. However, our measures of motor behavior suggested infants at ER may increase their overall level of motor activity over an extended period of robot reinforcement. Given similar average look durations, robot reinforcements may have offered similar levels of interest for infants at ER compared to infants at CR. We plan to explore our data further by examining the baseline phase of the contingency paradigm. Additionally, we plan to further analyze our visual gaze and movement data by examining visual anticipation on the reinforcement and evidence of “sticky attention”. A more detailed analysis of motor learning could indicate potential learning differences between the two groups.

413.191 (Poster) Blink Rate Reveals Distinctive Patterns of Attentional Engagement in Young Autistic Toddlers Via Digital Phenotyping Tool

Background:
Spontaneous blink rate has been used to index attentional engagement, with lower blink rates reflecting increased engagement. The evolutionary basis of varying blink rate stems from the idea that real-time assessments of the salience and value of information unconsciously change blink rate to increase or decrease the amount of visual information processed. Prior studies indicate that the blink rate and attention engagement were reduced or distinct in autistic (AUT) children compared to their neurotypical (NT) counterparts. Here, we use computer vision analysis (CVA) for automatically quantifying patterns of attentional engagement in young autistic children based on facial orientation and blink rate.

Objectives:
To develop a digital phenotyping tool for scalable, objective, and quantitative estimates of attentional engagement in toddlers. This requires implementing and designing robust CVA methods to detect blink rate and facial orientation in primary care settings.

Methods:
Participants were 474 toddlers (17–36 months old), 43 of whom were diagnosed with autism. Movies containing social or nonsocial content (screenshots in Figure 1) were presented on a tablet whose camera recorded the children’s behavior while they watched the movies. Nonsocial movies contained dynamic objects while social movies had human actors. Tools such as OpenFace and IntraFace were used to track blinking events and facial orientation (respectively), to obtain blink rate and total facing forward proportion for the duration of each movie. The estimated gaze using a deep neural network model was used to ensure that the toddlers were looking toward the screen.

Results:
Overall, autistic children spent less time facing the screen (NT: P<.0001, r=0.68, AUT: P=.043, r=.33) and had a higher mean blink rate compared to neurotypical children (Figure 1 and Figure 2), who also blinked at a lower rate during the social movies compared to the nonsocial movies (NT: P<.0001, r=0.55, AUT: P=.21, r=.17). On average, neurotypical children faced the screen more often during social movies than autistic children, whereas the two groups did not differ in their tendency to face toward the nonsocial movies. For all the social movies, significant P-value and medium-large effect sizes (see Figure 2) were found for both total facing forward proportion and blink rate, unlike for nonsocial movies (except “Toys”). The observation is consistent with eye tracking studies that reported the autistic toddlers exhibit lower overall sustained attention to any dynamic stimuli.

Conclusions:
Blink rate and orientation automatically measured via CVA using an app on a smart tablet offer an objective, quantitative, scalable method for detecting distinct patterns of social and nonsocial attentional engagement in autistic toddlers. Our findings are consistent with past work performed with high-grade tools; in contrast to these, our method does not require per-subject calibration or laboratory equipment. Autistic and neurotypical toddlers displayed distinctive patterns of attentional engagement with the social compared to the nonsocial movies. This work is a step towards developing scalable and robust phenotyping tools to objectively quantify behavior related to autism and the assessment of the response to early interventions.

413.192 (Poster) Change in Developmental Functioning for Young Children in Early Intervention: The Contributions of Child Social-Emotional and Behavioral Functioning and Autism Diagnosis

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Background: The U.S. federal Part C Early Intervention (EI) program provides services for autistic children, as well as children with developmental disabilities, under three-years-old. Delays in social-emotional and behavioral (SEB) functioning are higher in young autistic children. However, little is known about how SEB functioning impacts developmental gains for children diagnosed with autism spectrum disorder (ASD) receiving EI services.

Objectives: This study addressed how ASD diagnosis and SEB functioning are associated with developmental gains in EI.

Methods: Data were drawn from Department of Public Health records for 610 children receiving services from EI agencies participating in an ASD screening study from 2011-2019 and who had a repeated developmental evaluation following screening. The sample was restricted to children with a documented ASD diagnosis, or who remained in EI until 30 months (or longer), so that there was greater opportunity for ASD identification. About a third of children in the sample received a diagnosis of ASD (n = 187). Most children were male (67.4%), non-White (77%), and had a primary household language of English (61%). On average, children were 19-months-old at the time of EI entry. The Battelle Developmental Inventory, Second Edition (Battelle-2) assessed developmental functioning at EI entry and exit, or follow-up. The Brief Infant Toddler Social Emotional Assessment (BITSEA) was used to operationalize SEB functioning in terms of SEB problems and competencies. Covariates included: developmental functioning at EI entry, child sex, child age at EI entry, family race/ethnicity, and primary household language. Hierarchical multiple regression was used to assess the contribution of SEB functioning and ASD diagnostic status on change in developmental functioning while controlling for covariates.

Results: A hierarchical multiple regression model predicting exit Battelle-2 scores was conducted with entry Battelle-2 scores at step 1; child-level covariates at step 2; family-level covariates at step 3; ASD diagnostic status at step 4; SEB problems at step 5; SEB competencies at step 6; three two-way interaction terms at step 7 (ASD group X problems/competencies and problems X competencies); and a three-way interaction term at step 8 (ASD group X problems X competencies). The final model (step 7) accounted for 49.8% of the variance in developmental functioning at the time of EI exit. The model showed that the following predictors were significantly associated with greater developmental gains: higher developmental functioning at the time of EI entry ($\beta = .31$), being a female ($\beta = .08$), identified as White ($\beta = .11$), not having an ASD diagnosis ($\beta = .23$), and having more SEB competencies ($\beta = .24$). Age, household language, and SEB problems did not significantly contribute. Of the interaction terms, only BITSEA problems by competencies was significant ($\beta = -.09$). See Figure 1.

Conclusions: EI is an important resource for families of young autistic children. Yet, findings highlight child- and family-level factors associated with gains in developmental functioning during EI, including diagnostic status. Focusing on enhancing SEB competencies may be one strategy for increasing the developmental gains of autistic children. Racial/ethnic disparities in EI services also need to be addressed.

413.193 (Poster) Characteristics of Gesture Communication in Young Children with Autism during Naturalistic Play Interactions

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Background: One of the earliest signs of autism is the absence or the delayed onset of non-verbal communication, such as gesture behaviors. While there is a large body of literature showing the importance of gestures in predicting and supporting language development in typically developing (TD) children and in other clinical populations, there are still many open questions about this topic in autism. Very limited studies, with relatively small sample sizes, and in school-aged children with autism have explored gesture behaviors. For this reason, the paper proposes to investigate early socio-communicative development in very young children with autism under the lens of gesture behaviors, using a fine-grained microanalytic coding system. The theoretical framework is the Embodied Cognition, according to which social communication has roots in motor behaviors and early sensorimotor interactions. Since infancy, early motor schemes, scaffold
the emergence of gestures that in turn act as supporting links toward social communication and language during daily child-caregiver communicative interactions.

Objectives: The aim of this study was to explore how gestural communication is expressed in toddlers and young children with autism, compared to TD children, during naturalistic play interaction. The main goal was to detect whether possible differences in gesture behavior could be expressed not only quantitatively (e.g. absence or lower level of gestural production in autism), but also qualitatively (e.g., production of different types of gestures and with a different pragmatic function).

Methods: The study had an cross-sectional design and was conducted on a group of 30 toddlers and young children with and without autism (N=15 per group, 8 F). Children with autism and TD were individually matched according to the autism child’s developmental age (mean = 23 months). To explore gestural communication, we used a detailed micro-analytic system from video footage of naturalistic mother-child interactions. Relevant behavioral information from video contents were extracted using a moment-by-moment coding strategy and a detailed coding scheme specifically developed to capture the amount and types of gestures, and their pragmatic functions.

Results: Results showed that, compared to the TD group, the autism group: (i) produced a significantly lower number of total gestures (Z = 100, p = 0.003); (ii) tended to produce a lower proportion of conventional gestures with a trend towards statistical significance (Z = 50, p = 0.052); (iii) produced a significantly lower proportion of showing gestures (Z = 69, p = 0.013); (iv) produced gestures mainly for expressing the pragmatic function of request (Z = -73, p = 0.007 ), while TD children used significantly more gestures for declarative purposes (Z = 93, p = 0.006). Interestingly, among different gesture types, only children with autism produced instrumental gestures.

Conclusions: Overall these preliminary findings suggest a specific deficit in social sharing and declarative functions (i.e. lower production of conventional gestures and showing) in autism, with a preferential use of gestures to direct others behavior and address their requests (exclusive use of instrumental gestures and greater use of requestive function).

413.194 (Poster) Characterizing Associations between Quantitative Autistic Traits and Language Development in Toddlers

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Background: Language delay is a common co-occurring condition in autism spectrum disorder (ASD), which has been shown to manifest prior to the age of diagnosis (Swanson et al., 2016), to be associated with familial liability for ASD (Marrus et al., 2018), and to predict long-term neurodevelopmental outcomes in children with ASD (Magiati et al., 2014). At the same time, abilities contributing to social communication that are disrupted in ASD, such as joint attention, are known to influence language outcomes (Morales et al., 2000). Characterizing early developmental relationships between language function and quantitative autistic traits (QATs), i.e., subthreshold levels of heritable ASD traits encompassing a continuous range across typically developing and atypically developing populations, can be informative for clarifying the developmental progression of these interrelationships and the optimal timing for ASD interventions targeting these domains.

Objectives: Examine concurrent and longitudinal relationships between expressive language and quantitative autistic traits (QATs) across toddlerhood in a general population sample, which affords the advantage of characterizing interrelationships across a range of language ability and ASD trait levels that span the continuum of typical to atypical development.

Methods: Epidemiologically sampled toddler twins (n=699; 112 monozygotic pairs, 237 dizygotic pairs, 1 unmatched twin) from the general population were longitudinally assessed as part of the Early Reciprocal Social Behavior Study (HD068479) between the ages of 18 and 36 months. At 18- and 24-month time points, quantitative autistic traits (QATs) were quantified using the “Video-referenced Rating Scale of Reciprocal Social Behavior” (vrRSB), a metric indexing QATs as deficits in reciprocal social behavior (Marrus et al., 2015). The vrRSB represents a downward extension of the Social Responsiveness Scale-2 (SRS-2), a QAT measure applied at age 36 months. Expressive language was quantified at 18, 24, and 36 months using age-appropriate versions of the MacArthur Communicative Development Inventory. Pearson correlations assessed relationships between QATs and expressive language within and across time points. Generalized estimating equations (GEE) accounting for twin relatedness tested interrelationships between 18-month QATs and 36-month expressive language, as well as 18-month expressive language and 36-month QAT outcome.

Results: QATs showed concurrent inverse associations with expressive language scores at 18, 24, and 36 months, with the highest magnitude correlations observed at 18 months (r=-0.44, p<.001; r=-0.38, p<.001; r=-0.15, p<.001). The correlation of 18-month QATs to 36-month expressive language (r=-0.28, p<.001) was nominally larger than that for 18-month expressive language with 36-month QATs (r=-0.19, p<.001). GEE models showed that 18-month expressive language, 18-month QATs, and their interaction each contributed significant variance to 36-month expressive language outcome (Figure 1). GEEs examining relationships of 18-month expressive language and QATs to 36-month QATs found that only 18-month QATs contributed significant variance to the model (Table 1).

Conclusions: QATs additively and interactively contributed to expressive language in early childhood, whereas associations between expressive language and QATs were largely concurrent rather than predictive. While individualized interventions targeting both QATs and
Background: Research has shown that infants at increased likelihood for autism spectrum disorder (ASD) have difficulties regulating their emotional states, which is often characterized by atypical behavioral expression and physiological arousal. Yet, the relation between behavioral and physiological indices of emotion regulation and their association with ASD symptoms remains unclear. Thus, a behavioral-physiological approach is warranted to study the role of emotion regulation in the emergence of ASD.

Objectives: The objectives were to (1) determine whether indices of behavioral affect and heart-rate were congruent (i.e., significantly correlated) during negative activities of an emotion regulation task, and (2) examine the relations between congruence and later ASD symptoms in an infant sibling cohort.

Methods:

Participants: Participants were 103 infants at increased likelihood (IL; have an older sibling with ASD) and 52 infants at low likelihood (LL; no family history of ASD) for ASD. Infants were assessed at 6, 12, 18, and 24 months of age.

Emotion Regulation: At 6, 12, and 18 months, infants were assessed on the emotion regulation task, which is comprised of activities designed to elicit negative emotions (toy removal, masks, grooming; Sacrey et al., 2021). Behavioral affect was coded for valence (positive, negative, neutral) and intensity (to differentiate mild from intense displays of affect) using Noldus Observer software. Raw heart-rate was recorded and extracted from an electrocardiogram signal and the data were processed and transformed into a metric of average change in heart-rate from baseline.

ASD Symptom Expression: At 24 months, infants underwent the Autism Diagnostic Observation Schedule 2nd Edition Toddler Module (ADOS-2-T) to measure ASD symptoms.

Analytical Approach: Behavioral affect and heart-rate were collapsed into 5-second time intervals during the negative activities of the emotion regulation task. To assess congruence, data were analyzed using Spearman’s rank-order correlations. Group differences (IL, LL) in congruence (rho values) across the negative activities at 6, 12, and 18 months were explored using Mann-Whitney U tests. Kruskal-Wallis tests examined if negative activities at 6, 12, and 18 months were associated with 24-month ASD symptoms.

Results: There were no group differences in congruence during the negative activities at 6 (U=362.000, p=0.437), 12 (U=1048.000, p=0.132), or 18 (U=358.000, p=0.973) months, thus group was collapsed for the remainder of the analyses. There was a significant association between participants characterized by negative congruence and ASD symptoms, such that increased negative affect and greater heart-rate at 6 (q’s=0.017–0.050) and 12 months (q’s= 0.025–0.050) was associated with greater ASD symptoms at 24 months.

Conclusions: The absolute level of agreement between behavioral affect and heart-rate was low in infants at IL and LL of ASD. Moreover, no significant differences in congruence between IL and LL infants were seen. It is important to note that this does not preclude the possibility that affect and heart-rate might separately predict subsequent ASD symptoms or diagnostic status. Overall, the study highlights the complexities entailed in examining temporal relations between behavioral and physiological indices of emotion regulation during infancy. Future work will investigate how affect and heart-rate differentially impact the emergence of ASD.

413.196  (Poster) Defining Resiliency in 6-Month-Old Infants with and without Siblings with Autism: A Data-Driven Approach from the Baby Siblings Research Consortium

Background: Convergent evidence highlights biological and nonbiological factors associated with resilience from atypical neurodevelopment in infants with and without familial history of ASD (Elsabbagh, 2020). A primary challenge involves defining the axes upon which both outcomes and potentially associated precursors to those outcomes may be established (Masten & Coatsworth, 1998).

Objectives: To use data-driven approaches to define developmental status at ages 6 and 36 months in infants with siblings with ASD (ASIB) and without (NSIB) from the Autism Science Foundation’s Baby Siblings Research Consortium with the goal of identifying factors associated with functional outcomes.

Methods: We used principal component analysis (PCA) on Mullen Visual Reception, Fine Motor, Receptive Language, and Expressive Language domains at 6 months (NSIB N=391) and Mullen and ADOS (CSS-Total, SA, and RRB) at 36-months (NSIB N=618) to define axes of developmental performance. The first principal component (PC#1), accounting for the greatest variance in behavioral measures, defined a threshold separating the top 85% of the NSIB group (“upper”) from the bottom 15% (“lower”) at each timepoint. In 1035 infants (ASIB N=679, NSIB N=356; Table 1a) seen at both 6 and 36 months, relationships between infant sex, sibling group (ASIB or NSIB), 6-month PC#1 status (upper or lower), and 36-month PC#1 outcomes (upper or lower) were examined using Chi-square tests. This was followed by BIC-driven stepwise model simplification of exploratory logistic regression considering factorial effects of sex, sibling group, PC#1 6-month status, and 6-month PCs #2-4.

Results: Derived principal components at 6 and 36 months are shown in Figure 1a. The probability of upper group membership at 36 months was greater in (Table 1b) NSIB compared to ASIB children for those with 6-month lower (X(1,N=198)=15.9, p<.001) and upper status (X(1,N=837)=73.1, p<.001). 6-month upper status was associated with higher probability of 36-month upper membership in ASIB (X(1,N=679)=9.4, p<.002) but not NSIB (X(1,N=356)=3.0, p=.082). The probability of upper membership at 36 months was greater for girls than boys for both ASIB (X(1,N=679)=31.0, p<.001) and NSIB (X(1,N=356)=6.9, p=.008) infants, and greater for ASIB as compared to NSIB infants for both girls (X(1,N=475)=32.1, p<.001) and boys (X(1,N=560)=57.7, p<.001). Stepwise reduction of unified logistic regression predicting 36-month upper status yielded additive main effects of sex (X(1,339)=33.9, p<.001), sibling group (X(1,977)=97.7, p<.001), and 6-month PC#1 status (X(1,128)=9.9, p=0.002). In girls, 36-month upper status was negatively associated with 6-month PC#4 interaction (X(1,452)=9.6, p=.002). In girls, 36-month upper status was negatively associated with 6-month PC#4 (M=-.252, 95% CI: -.512, .008) suggesting stronger visual reception than fine motor was advantageous, whereas for boys the opposite was observed (M=.293, 95% CI: .070, .517).

Conclusions: Results suggest additive effects associated with likelihood of data-driven clinical composites of 36-month outcomes in infants. These effects include well-known female protective effects against atypical neurodevelopment, developmental vulnerabilities associated with ASIB, and persistence of earlier observable developmental concerns. Exploratory findings also suggest sex-specific interactions with the tension of nonverbal domains, with males benefiting from stronger fine motor skills, and females benefiting from stronger visual reception. Subsequent research is needed to further investigate and confirm these findings.

413.197 (Poster) Delay of Gratification Performance in Preschoolers with Autism or Risk for ADHD

Background: Autism and attention-deficit/hyperactivity disorder (ADHD) likely share developmental pathways (Johnson et al., 2015). Children with autism and ADHD show difficulties in self-regulation which are predictive of problems later in life (e.g., social and cognitive difficulties, academic underachievement) making it important to identify difficulties in this area as early as possible. However, questions remain regarding similarities and differences in self-regulation behaviors in young children with autism or those who are showing clinically relevant concerns for ADHD during the preschool years.

Objectives: To examine self-regulation behaviors using a delay of gratification task in preschoolers with autism and those showing clinically relevant concerns for ADHD (i.e., ADHD Concerns) compared to children without these concerns.

Methods: Participants (n=180) were originally enrolled as infants into one of three familial likelihood groups: family history of autism (i.e., elevated likelihood of autism; n=91), family history of ADHD (i.e., elevated likelihood of ADHD; n=40), and no family history of either

Table 1a
| Table 1b |
(i.e., low likelihood of autism/ADHD; \(n=49\)). At the 36-month visit, participants were classified into one of the three outcome groups: autism (\(n=26\)), ADHD Concerns (\(n=24\)), and a Comparison group (i.e., not meeting criteria for either of the other groups, \(n=130\)).

As part of the 36-month battery, children were administered a delay of gratification task in which they were presented with a snack and instructed to wait for unspecified amounts of time (5, 10, 20, 30 seconds) before they could eat the snack. Survival analysis for the longest wait trial (30 sec) was used to examine the association between outcome group and likelihood of eating the snack, with and without adjusting for Mullen Scales of Early Learning-derived verbal Developmental Quotient (DQ).

Results: By 30 seconds, 60% of participants in the autism group, compared to 16% in the Comparison group ate the snack (HR=5.03, \(p<.001\)). Additionally, 35% of participants in the ADHD Concerns group ate the snack (HR=2.32, \(p=0.04\) vs Comparison and HR=0.46, \(p=0.08\) vs autism group). Adjusting for verbal DQ attenuated these associations, although the autism group continued to show greater likelihood of eating the snack sooner at 30 seconds relative to the Comparison group (aHR=2.87, \(p=0.01\)). The adjusted likelihood of the ADHD Concerns group eating the snack sooner was not significantly different from the Comparison (aHR=1.61, \(p=0.28\)) or autism groups (aHR=0.56, \(p=0.23\)).

Conclusions: Participants in the autism and ADHD Concerns groups had more difficulty delaying gratification relative to the children without these conditions. Language abilities accounted for some of these differences, indicating that language skills may play a role in behaviors underlying self-control and, in some cases, poorer understanding of the task may have impacted children’s performance. Because self-control difficulties are associated with poorer outcomes, the next step is to identify early indices that may predict 36-month self-control skills with the aim of determining vulnerability to such problems and providing interventions early in life.

413.198 (Poster) Designing Toys for Autism: Integrating Clinical and Developmental Science into a Professional Design Curriculum

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Background: Play is a core function of early childhood and is impacted by Autism Spectrum Disorders. It is a context that supports social learning, language and communication development, and other aspects of early development. Play is also intrinsically fun and motivating and supports quality of life for young children. Developmentally informed toy designs can support the ability of autistic children to engage in play. Baccalaureate and post-baccalaureate programs in toy design do not typically focus on special populations.

Objectives: The objective of this presentation is to describe a toy design program that integrates knowledge about autism and developmental approaches to supporting play and social communication into an undergraduate curriculum.

Methods: Students were enrolled in an established and specialized toy design program at an urban public university. The program includes theory, practical applications, and mentored hands-on training to prepare students for work in industry, with most students placed in design roles at companies that design toys and other consumer products for children. In their senior year, students participated in a year-long sequence that included the following elements: 1) readings and didactics on autism in early childhood, developmental and autism-specific aspects of play, and evidence based supports for play in children with autism and 2) observations in a school for children with autism and developmental disabilities. Parallel to these experiences, each student engaged in a semester-long capstone design project that included development of product rationale, determining overlap with existing products, detailed artistic renderings, and ultimately a scale model prototype of the toy. Feedback from toy design faculty and from the collaborating autism content experts was provided at sessions in the second semester and informed final designs.

Results: Four cohorts of students have completed the program (12 – 15 per cohort). Students produced designs for toys, defined as products that can be used as objects in play routines. Several themes emerged from the designs, including: 1) degree of specificity to autism; 2) endpoint goals of teaching specific skills or knowledge (instrumental) or on supporting play itself (intrinsic); 3) a focus on supporting play routines (instrumental or intrinsic) or on supporting the child (e.g., products intended to help with coping or stress reduction); 4) degree of focus on autism phenotypic characteristics, and if so a focus on social communication behaviors or sensory needs; and 5) a focus on how individual children interact with the toy versus a focus on dyads or groups interacting with a toy. Examples of artistic renderings are presented in the accompanying figures. Ongoing work will involve a survey of students to assess engagement in the program and impact on post graduate activities.

Conclusions: Translational approaches often focus on using medical and behavioral science knowledge to develop treatments or programs administered by professionals or in therapeutic, educational, or professional settings. This collaboration, with representation from clinical service, developmental and clinical research, stakeholder groups and toy design faculty, is an example of another model of translation that has the potential to support autism-friendly design into commercially available and viable products.

413.199 (Poster) Development of Lateralized Brain Oscillations in Infants at Risk for Autism
Background: One of the common early features of Autism Spectrum Disorder (ASD) is language delay. It is estimated that nearly 50% of toddlers with ASD present language impairments, yet the biological mechanisms underlying these deficits are not fully understood. Recent studies suggest that differences in language abilities may be attributed to atypical brain lateralization during development. Language processing activates the left hemisphere in 96% of the population, but studies on autistic children indicate diminished hemisphere dominance. Thus, more research is needed to assess 1) whether atypical lateralization emerges early in infancy, and 2) whether lateralization patterns are associated with language outcomes in ASD.

Objectives: The goal of this study is twofold. First, we explore the developmental trajectories of brain lateralization in infants at risk for autism during the first two years of life. Second, we examine the relationship between brain lateralization, and receptive and expressive language abilities in toddlerhood. We hypothesize that autistic infants will have less lateralization than the control group.

Methods: This study used data from the International Infant EEG Data Integration Platform (EEG-IP); a multi-site cohort study of infants at risk for ASD and age-equivalent controls (London: 7, 14 months; Seattle: 6, 12 months). Participants were either in an at-risk group (n=98) or a control group (n=94) by virtue of having an older sibling with autism. Of the at-risk infants, 39 were later diagnosed with ASD based on the Autism Diagnostic Observation Schedule (ADOS) at 36 months and clinical evaluation. Resting-state high-density EEG recordings were preprocessed for artifacts and cortical sources were estimated to identify brain regions associated with EEG activity. Finally, lateralization scores were correlated to receptive and expressive language scores extracted from the Mullen Scales of Early Learning (MSEL) at 6 and 12 months.

Results: Consistent with the literature, all groups exhibited predominantly left-hemisphere lateralization at 6 months. However, a three-way ANOVA revealed a statistically significant interaction between the diagnostic outcome and EEG frequency band at 12 months of age (F (2,184) = 7.85, p = .001). At 12 months, autistic infants showed an increase in left-hemisphere lateralization while the control group shifted towards symmetry. Moreover, source estimation revealed that differences between autistic infants and controls were accentuated in the superior temporal gyrus (STG). In terms of language skills, we found a statistically significant correlation between left-hemisphere dominance of the STG and expressive language at 12 months of age across all groups. Additionally, infants with more left-hemisphere lateralization had higher expressive language scores.

Conclusions: Establishing the development of brain lateralization and autism risk is an important first step toward improving our understanding of the etiology of ASD. Overall, our study showed that by 12 months of age, autistic infants had more lateralization in the STG compared to controls. The STG is a region thought to be important for phoneme discrimination, auditory attention, and based on our results it can potentially be a precursor for language learning. Language is a key part of development and our study elucidates the neural mechanisms that contribute to language learning during infancy.

413.200 (Poster) Developmental Impacts of the COVID-19 Pandemic Among Infants at High and Low Likelihood for Autism or ADHD

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Background: Recent work has suggested pandemic-related developmental decrements among infants (Deoni, 2022; Imboden et al., 2021). Infants with family histories of neurodevelopmental conditions like autism or ADHD are already at risk for developmental concerns (Miller et al., 2021; Ozonoff et al., 2010). Whether developmental impacts of the pandemic differentially affect infants with higher genetic risk for autism or ADHD is unknown.

Objectives: We evaluated pre- and peri-pandemic differences in development among 12-month-olds recruited into two prospective longitudinal studies of the early autism and ADHD phenotypes (one pre-COVID, one peri-COVID), and examined whether such impacts interact with genetic susceptibility for these conditions based on family diagnostic history.

Methods: Both studies used identical protocols and measures; Pre-COVID cohort data were collected between 2017-2019, while Peri-COVID cohort data were collected between 2021-present. Participants included 122 12-month-olds: n=88 in the Pre-COVID cohort (n=23 low likelihood [LL], n=37 elevated likelihood ASD [EL-ASD], n=28 elevated likelihood ADHD [EL-ADHD]) and n=34 in the Peri-COVID cohort (n=18 LL, n=6 EL-ASD, n=10 EL-ADHD). Peri-COVID cohort data collection is ongoing. Development was evaluated using the Mullen Scales of Early Learning Visual Reception, Fine Motor, Receptive Language, and Expressive Language subscales (T-scores). Verbal, Nonverbal, and overall Developmental Quotients (DQs) were also calculated. Consistent with public health guidance and institutional policies, examiners were masked during Peri-COVID cohort data collection.
A series of ANOVAs were conducted with developmental subscale/composite score as the dependent variable and Cohort and Recruitment Group (LL, EL-ASD, EL-ADHD) as independent variables, examining main and interaction effects.

Results: Results are displayed in Figure 1/Table 1. With the exception of Visual Reception, there were main effects of cohort for each developmental subscale/composite. In all cases, the Peri-COVID cohort exhibited lower scores than those evaluated pre-COVID. There was a main effect of Recruitment Group for the Receptive Language subscale, with the EL-ASD group (M=43.12, SD=8.81) exhibiting marginally lower scores than the EL-ADHD group (M=46.68, SD=7.86), $p=0.06$. The Recruitment Group*Cohort interaction was not significant for any subscale/composite.

Conclusions: Consistent with work in other samples, our findings suggest developmental impacts of the pandemic on infants in nearly all domains. Still, scores were, at a group level, generally still in the average range (with VDQ scores on the cusp of the Below Average range in the Peri-COVID cohort). Our findings also suggest these developmental impacts operate similarly across genetic risk for neurodevelopmental concerns. However, Peri-COVID cohort data collection is ongoing (anticipated additional 100 12-month visits by April 2022), and inspection of group means suggests potential differential susceptibility of verbal development in the EL-ASD group. Whether pre-/peri-COVID developmental differences are the result of reduced social learning opportunities over the first year of life due to physical distancing, and/or the impact of examiner masking during developmental testing on auditory and/or visual cues related to language comprehension, requires further investigation. Moreover, additional work is needed to evaluate whether such decrements are time-limited or persist over the first several years of life. Such questions will be addressable with ongoing follow-up of these samples.

### 413.201 (Poster) Developmental Profiles of Infants with Different Types of Neurodevelopmental Risk

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**Background:** Much of our understanding of early development in children with autism spectrum disorder (ASD) comes from studies of infants with a family history of autism. Extending this knowledge to infants with medical histories or genetic conditions that make autism and related neurodevelopmental issues more likely can broaden our understanding of autism as it first emerges. Here, we directly compare early developmental profiles of infants with a family history of ASD (FamHx), extended Neonatal Intensive Care Unit hospitalizations (NICU), tuberous sclerosis complex (TSC), and low-risk controls (LR controls).

**Objectives:** To better understand the development of 12-month-old infants with differing backgrounds, we will (1) assess inter-correlations among developmental measures, (2) compare scores on developmental measures among FamHx, NICU, TSC, and LR control groups, and (3) examine group differences in rates of delay.

**Methods:** Infants were enrolled in a prospective study examining early biological and behavioral markers of autism and developmental delays. The current sample consisted of 106 infants ($n$ varied by analysis). FamHx infants ($n=49$) had at least one older sibling with ASD. NICU infants ($n=22$) had a NICU hospitalization and medical condition that qualified them for the state-funded High-Risk Infant Follow-up Clinic (e.g., born<32 weeks, neurological and/or cardiovascular concerns). TSC infants ($n=14$) had a clinical diagnosis. LR controls ($n=21$) had a neurotypical older sibling, no major medical issues, and no known first-degree relatives with ASD. Groups differed by race/ethnicity but not gender (see Table). Measures included: Vineland Adaptive Behavior Scales-3rd Edition (Vineland-3), Mullen Scales of Early Learning (MSEL), Ages & Stages Questionnaire-3rd Edition (ASQ-3).

**Results:** (1) Moderate to high correlations were found between the direct measure (MSEL), parent interview (Vineland-3), and parent report (ASQ-3) within domains, suggesting consistency across scales (e.g., MSEL & ASQ-3 Gross Motor, $r=.796$; MSEL Receptive Language & Vineland-3 Communication, $r=.690$). (2) Group differences were found in motor ($Eta^2=.125-.320$), early nonverbal cognition ($Eta^2=.196-.241$), communication/language ($Eta^2=.159-.195$; exception: MSEL Expressive Language $p=0.115$), and social skills ($Eta^2=.095-.192$). Differences were largely driven by developmental delays in the TSC group. Generally, LR controls had the highest scores, TSC the lowest, and FamHx and NICU fell in between with wide variability within these groups. (3) Using ASQ-3 cutoff categories, associations were detected between risk group and rate of delay across areas ($ps<.001$; see Figure).

**Conclusions:** Measurements of development level by domain were quite consistent across the varied measures used. TSC infants were much more likely to show clinically significant developmental delays at this young age, which is expected given that all infants in this group were known to have a neurogenetic condition. FamHx and NICU infants tended to have lower scores and higher rates of developmental delays than the LR controls, but these differences were not always significant and most were developing as expected at 12 months. Higher rates of gross motor delays were observed in the NICU group, while FamHx infants tended to show higher rates of delay in ASD-associated domains (communication and social). Increased incidence of delays and autism concerns are expected as the infants age. Data collection is ongoing.

### 413.202 (Poster) Developmental Trajectories of ADOS-2 Scores in Toddlers at Elevated Likelihood of Autism

Background:

Core characteristics of autism develop slowly and subtly during infancy and toddlerhood and are sometimes hard to grasp. Developmental trajectories differ between individual children, and early administration of ADOS-2 could be valuable in predicting evolution of characteristics in toddlers at elevated likelihood (EL) of developing autism.

Objectives:

The aim of the current study is to cluster trajectories of repeated ADOS-2 scores in EL-toddlers. This will allow us to pinpoint if and when trajectories might start diverging and at what age ADOS-2 administration would be most informative for future outcome.

Methods:

ADOS-2 was administered at the ages of 14, 24 and 36 months in a sample of 112 EL-toddlers, as part of a prospective longitudinal study. These toddlers were either younger siblings of autistic children (N=64), toddlers born before 30 weeks gestational age (N=38) or toddlers with medically insufficiently explained feeding or eating difficulties (N=10). Calibrated severity scores (CSS) were calculated, to enable comparison between the scores resulting from different ADOS-2 modules at different ages and language levels. Due to COVID-19 interruptions, only 246 observations were collected. To avoid issues caused by missing data, a feature-based clustering approach was used. After plotting individual linear regression lines, participants were clustered based on individual intercepts and slopes, using k-means clustering (Figure 1). This process was repeated for the Total CSS and the subscales of Social Affect (SA) and Restricted and Repetitive Behaviors (RRB). Descriptive statistics were used to describe and compare the clusters. At the time of the INSAR conference, additional analyses including the best estimate research diagnoses will be available. Individual cluster-profiles, i.e. the combination of the Total CSS, SA CSS and RRB CSS clusters per participant, were investigated.

Results:

Each cluster analysis resulted in three clusters of trajectories. In the Total (Figure 2a) and SA CSS, similar trajectories were found: (1) low start – steep increase, (2) low start – stable, (3) high start – slow decrease. In the RRB CSS (Figure 2b), (1) a similar stable and (2) a similar decreasing trajectory were found, besides (3) an earlier increasing trajectory. None of the clusters differed based on sex or on composition of different EL-toddler groups. Analysis of individual cluster profiles showed that the most prominent profile (24.1% of participants) was a stable trajectory profile on all three scales.

Conclusions:

Feature-based cluster analysis of repeated ADOS-2 administration in a heterogenous group of EL-toddlers reveals three distinct trajectories for all CSS scales. Clustered trajectories for the Total CSS and SA CSS are more similar than the trajectories in the RRB CSS, as expected based on psychometric properties. Previous research in siblings of autistic children showed largely similar results, however often a severe persistent and a stable non-spectrum group were found, instead of one stable group. Differences between trajectories in the Total and SA CSS were more prominent after the age of 24 months, implying that administration of ADOS-2 at 14 months, is less informative. Limitations include the inability to walk of some participants at 14 months and the use of face masks during about half of the administrations.

413.203 (Poster) Developmental Trajectories of Adaptive Functioning in Toddler with Developmental Disabilities

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Background: Previous studies have shown that adaptive behavior or adaptive functioning plays an important role for outcomes and prognosis in individuals with developmental disabilities, including autism spectrum disorder (ASD) and developmental delays (DD). However, ASD is a fairly heterogeneous group, with some individuals with normal cognitive development or language skills and others with significant impairments, while children with DD also have shown different types of impairments.
Objectives: The purpose of this longitudinal study was to examine the developmental trajectories of adaptive behavior and the relationships between adaptive behavior and mental abilities and autistic symptoms in toddlers with developmental disabilities. By analyzing the characteristics of adaptive behavior development subgroups, effective intervention can be planned for toddlers with different developmental disabilities.

Methods: The current study recruited 102 toddlers with developmental disabilities who were assessed when they were between 16 and 35 months of age (Time 1, T1) and were followed up 18 (Time 2) and 36 months (Time 3) after the first assessment. The current study applied the Adaptive Behavior Assessment System-Second Edition (ABAS-II), a parent-report questionnaire to assess the adaptive behavior of toddlers with developmental disabilities.

Results: There were three distinct developmental trajectories of general adaptive composite in toddlers with developmental disabilities. Group 1 (n = 36, 35%) had higher functioning and a maintaining trajectory, group 2 (n = 50, 49%) showed moderate functioning and an improving trajectory, group 3 (n = 16, 16%) had lower functioning and a maintaining trajectory. There were two distinct developmental trajectories of conceptual adaptive behavior in toddlers with developmental disabilities: Improving trajectory (n = 52, 51%) and worsening trajectory (n = 50, 49%). There were three distinct developmental trajectories of social adaptive behavior in toddlers with developmental disabilities: higher functioning and a maintaining trajectory (n = 35, 34%), moderate functioning and a maintaining trajectory (n = 11, 11%), and lower functioning and a worsening trajectory (n = 56, 55%). There were two distinct developmental trajectories of practical adaptive behavior in toddlers with developmental disabilities: higher functioning and a worsening trajectory (n = 23, 23%) and lower functioning and an improving trajectory (n = 79, 77%). The trajectory class assignments in general adaptive composite were related to diagnostic outcomes three years later. The improving trajectories of adaptive behavior in toddlers with developmental disabilities showed better mental abilities at T1 compared to the worsening trajectory group. And, the improving trajectories of adaptive behavior in toddlers with developmental disabilities also showed mild autistic symptom at T1 compared to the worsening trajectory group.

Conclusions: The findings of this longitudinal study indicated that the heterogeneity of adaptive behavior in toddlers with developmental disabilities. Most of the toddlers with developmental disabilities showed impairments in adaptive behavior. However, part of this sample, which showed better adaptive behavior comparable to typically developing toddlers. The findings of the current study provide the implications for practitioners to design early intervention for toddlers with developmental disabilities.

413.204 (Poster) Did Covid Shelter-in-Place Alter Early Clinical Profile in Autism? a Natural Experiment in Exploring Nature Versus Nurture

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Background:

Due to Covid-19, most autism diagnostic centers internationally were closed for in-person assessments for at least a year beginning March, 2020. When our center resumed in-person assessment in Spring 2021, many parents expressed concerns about potential sequelae of Covid Shelter-in-Place (CSiP) having delayed diagnostic assessment and access to early intervention. We ask: Did CSiP children (index sample) diagnosed with ASD in the first year post-CSiP have more severe ASD signs and/or more developmental delays than children diagnosed at the same ages pre-CSiP (comparison sample)? What were parent concerns about the possible effects of CSiP on their children and was this supported by assessment data?

Objectives:

We hypothesized that if CSiP-related delay in diagnosis and treatment negatively influenced markers of development related to ASD, baseline scores at initial diagnosis would be higher for autism severity, and lower for 1) receptive language, 2) expressive language, and 3) adaptive behavior than age-matched comparisons diagnosed before CSiP.

Methods: We reviewed qualitative data coded from narratives of parent concerns about their child’s presentation as due to CSiP as well as quantitative scores including DSM-5 ratings, ADOS score, and adaptive behavior (DP-4 or Vineland).

Results:

Index Sample: Between March 2020 and October, 2022, N=176 18-42 month-olds were seen for initial diagnostic assessment. Of these, 25 cases received telehealth diagnostic assessments, with 20 receiving an ASD diagnosis. We resumed in-person diagnostic assessment in April 2021, N=151, with 31% (N=55) not meeting criteria for ASD. Of the N=176, the home language was English (N=62), Spanish (N=70), Chinese/Vietnamese (N=32), or another language (N=12).

Comparison Sample: Between January 2018 and February 2020, N=144 18 to 42 month-olds were seen for initial diagnostic assessment. 77% (N=110) were diagnosed with ASD, and 23% (N=33) were assessed, but did not meet criteria for ASD. Of the N=144, home language was English (N=58), Spanish (N=50), Chinese/Vietnamese (N=29), or another language (N=7).
Preliminary analyses indicate that subsequent to CSiP, more children received a false-positive referral, \( \chi^2 (1, N=261) = 6.23, p = .012 \). In the future, we plan to examine differences in cognitive and adaptive abilities across groups, along with analysis of home language as a barrier to receiving diagnostic assessment subsequent to CSiP.

Conclusions:

Our data suggest many themes about the effect CSiP on young children with ASD in the short and long term. Parents expressed concern regarding potential regression or developmental stalling, and fear that a crucial period of neural plasticity had been passed over. Many parents experiencing telehealth assessment questioned accuracy/validity, and those experiencing telehealth treatment were concerned about efficacy. ESL families continued to receive telehealth treatment after programs had resumed ‘in-person’ for English-speaking families in their areas. Ongoing concerns included a flight of ABA service providers and special education aides so that long-delayed IEPs could not be implemented. While initial differences in diagnosis and access to services were explored in this study, young children diagnosed with ASD during CSiP will need to be followed longer term to more fully ascertain potential longer-term effects of the themes identified in this study.


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Background:

In recent years, adverse childhood experiences (ACEs) have begun to be systematically studied in Vietnam. However, current research focuses on children with typical development. For example, it lacks studies on children with autism spectrum disorders (ASD), who have difficulty self-reporting their experiences in the present and the past.

Objectives:

This study was implemented to identify common patterns of ACEs among children with ASD and the variables associated with these experiences as reported by caregivers.

Methods:

This is a cross-study. A questionnaire was given to more than 150 parents with children with ASD. There were 12 factors of ACEs, including physical abuse; emotional abuse; sexual abuse; family members with drug addiction/mental health disorders/imprisoned; domestic violence; parents divorced/death; emotional neglect; physical neglect; school violence; community violence.

Regarding children with ASD whose caregivers participated in the study, 72.2% were male, 27.8% were female; the mean age was 3.87 years; the mean age when diagnosing ASD was 28.06 months, the earliest is 14 months, and the latest is 48 months. 67.3% were the first child, 21.8% were the second, etc.; 70.9% lived with only parents, 14.5% lived with grandparents, and the left was with both parents, grandparents, and siblings.

Results:

The result shows that emotional neglect is the most common form of ACEs in children with ASD, followed by family members with mental health disorders, parents divorced/death, and family members imprisoned or addicted to drugs. Meanwhile, the less common forms included: emotional abuse, sexual abuse, and community violence (A lower mean score indicates a greater degree of ACEs). There was no significant difference in the degree of ACEs between male and female children with ASD or who lived in different areas.

In many children with ASD, the more frequently family members play with the child, the less likely the child will experience emotional abuse and domestic violence, with \( r=0.30^* \) and \( r=0.31^* \), respectively. In addition, the greater the number of siblings a child has, the less likely the child will experience emotional neglect (\( r=0.27^* \)). However, in some cases, the more siblings a child has, the more the child experiences school (\( r=-0.42^* \)) and community violence (\( r=-.032^* \)). In addition, children with older parents also experience community violence (\( r=-0.27^* \)).

The other results show that the higher the child's ability to self-serve, the lower the experience of living with divorced/dead parents (\( r=0.27^* \)), the higher the child's communication ability, the lower the child's experience of community violence (\( r=0.32^* \)). In addition, the
better the children’s motor skills, the lower the experience of living with a family member addicted to drugs, going to prison, and having parents divorced, with a correlation coefficient of \( r = 0.29*, r = 0.44*, \) and \( r = 0.47**. \)

Conclusions:

Family members’ care and proactive interactions with children with ASD seem to be protective factors against ACEs in the family. Meanwhile, the child’s skills play a role in avoiding ACEs in the community. However, future studies with larger samples need to be performed more for reliability and to explore other relevant variables.

**413.206 (Poster) Disability Versus Difference Autism Subtypes in Early Childhood**

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Background: Early developmental difficulties in the domains social-communication-interaction and restricted repetitive behaviors are the core of autism. While these features are important for maximizing clinical consensus and reliability, they fail to reveal important individual differences between autistic individuals that may be most relevant for explaining variability in the biology, outcomes and treatment responses. Alternatively, differences between autistic individuals in non-core domains such as early language, motor, intellectual and adaptive functioning may be key elements that separate out autism subtypes characterized by profound ‘disability’ versus ‘difference’ from typically-developing norms.

Objectives: We aim to test whether ‘disability’ versus ‘difference’ subtypes are present in early childhood and whether identification of such subtypes can be made in robust, stable, and objective manner with unsupervised data-driven stratification methods. If early subtypes can be identified, we will further test whether the subtypes are differentiated in terms of outcome and developmental trajectories throughout early childhood.

Methods: Vineland (VABS) and Mullen (MSEL) data from \( n = 773 \) autistic children less than 68 months old were identified within the National Institute of Mental Health Data Archive (NDA). VABS standard domain scores (communication, daily living skills, socialization, motor) and MSEL subscale developmental quotients (visual reception, VR; fine motor, FM; receptive language, RL; expressive language, EL) were input as features to reval stability-based relative clustering analysis (Landi et al., 2021). The optimal number of subtypes and generalization accuracy of the subtypes are tested within the reval framework. Subtype labels from reval are then used in longitudinal linear mixed effect models to test for age*subtype interactions on MSEL age-equivalent scores.

Results: VABS and MSEL data measuring language, motor, intellectual and adaptive functioning can be used to identify two early autism subtypes with highly stable out-of-sample prediction accuracy (98%). These subtypes can be described by individuals with very low scores across both MSEL and VABS (e.g., disability subtype) that are well below clinically-meaningful cutoffs for developmental disability versus individuals with much higher scores (e.g., difference subtype) that would not typically be considered as profound disability compared to the other subtype. Longitudinal analyses through the first 6 years of life show that the subtypes differ in rate of growth (i.e. age*subtype interaction) for all MSEL subscales (VR: \( F = 181, p < 0.001 \); FM: \( F = 185, p < 0.001 \); RL: \( F = 155, p < 0.001 \); EL: \( F = 188, p < 0.001 \)), with the disability subtype showing much slower growth than the difference subtype.

Conclusions: This work demonstrates that disability versus difference autism subtypes are highly stable and can be objectively identified with high accuracy in a data-driven manner in early childhood from patterns of language, motor, intellectual and adaptive functioning measured by routine standardized clinical assessment tests such as VABS and MSEL. These subtypes are developmentally and outcome-sensitive, as longitudinal results show that these groups show different rates of growth and highly differentiated outcomes by 6 years of age.

**413.207 (Poster) Do Children with Sex Chromosome Trisomies Display Features of Autism Spectrum Disorder in a Free Play Caregiver-Child Interaction?**

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Background: Children with Sex Chromosome Trisomies (SCTs), genetic syndromes characterized by an additional sex chromosome, have been reported to display social-communication difficulties similar to those of Autism Spectrum Disorder (ASD) more frequently than typically developing (TD) children (Bouw et al., 2022a; Bouw et al., 2022b). However, existing data are mostly limited to self-report and parent-report measures collected from clinical samples and therefore potentially prone to referral bias (Bishop et al., 2011).

Objectives: To compare social communication profiles of children with SCTs, ASD and TD on direct observational measures.
Methods: We compared 15 children of 24 months with prenatal diagnosis of SCTs (mean age in months 24.27, sd=0.59), with 15 TD children of 24 months (mean age in months 23.93, sd=0.59) and 15 children with ASD of comparable developmental age measured on the Griffiths Scales of Child Development, Third Edition (mean age in months 40.53, sd=9.73, developmental age 22-25 months). A free play caregiver-child interaction with a standard toy kit suitable for a range of developmental play levels was videorecorded and ten consecutive minutes were rated for child autism symptoms severity with the Brief Observation of Social Communication Change (BOSCC, Grzadzinski et al., 2016) and child engagement states and expressive language level with the Joint Engagement Rating Inventory (JERI, Adamson et al., 2020). To check agreement, 22% of the corpus was independently rated by a second observer. The inter-rater reliability on the double-coded videos was good on the BOSCC Total score (intraclass correlation coefficients, ICC=.71) and the JERI items (range of weighted Kappas: 0.72-1.0).

Results: Children with ASD showed significantly higher levels of symptoms severity than children with SCTs and TD children on the BOSCC Total Score and across all symptom domains. With regard to the JERI rating of child’s engagement states, the groups did not significantly differ on Unengaged and Object Engagement states. Significant group differences on Joint Engagement state were examined with post hoc analyses, performed with Bonferroni, showing lower scores, close to significance, in children with ASD than both TD children (p=.055) and children with SCTs (p=.074). Children with SCTs showed lower Expressive Language skills than TD children (p=.003) but did not differ from children with ASD (p=.480).

Conclusions: Consistently with previous evidence (Zampini et al. 2022), children with SCTs displayed lower expressive language levels than TD children, however they showed significantly lower autistic symptoms than children with ASD, not differently from TD children. In addition, we showed a non-significant trend for higher levels of joint engagement in children with SCTs than in children with ASD. The use of a direct observation measure and the characteristics of our sample (children with a prenatal diagnosis) arguably explain our findings, which are in contrast with previous evidence of increased rates of ASD-like symptoms in this population. The results must be interpreted cautiously due to the small sample size. In conclusion, possible social communication difficulties should be distinguished from linguistic impairments in children with SCTs, particularly for those identified with a prenatal diagnosis.

413.208 (Poster) EIP Participation Leads to a Diagnosis One Year Earlier for Children with Autism
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Background: Many children with autism spectrum disorder (ASD) are qualified for federally mandated (IDEA, Part C) Early Intervention Program (EIP) services due to developmental delays. These services can include evaluation and provision of interventions, potentially leading to better ASD outcomes, including earlier identification of ASD. A recent study showed that children participating in EIP were more likely to be diagnosed earlier with ASD. Professional evaluation leading to ASD diagnosis may expedite access to ASD specific services, programs, and interventions. The extent to which EIP facilitates the timing of ASD diagnosis has not been fully examined.

Objectives: To determine whether ASD children who received EIP services are diagnosed earlier than ASD children who did not participate in EIP and to describe differences in the distribution of individuals receiving intervention.

Methods: Data was collected from an active population-based surveillance system (NJ Autism and Developmental Disabilities (ADDM) Monitoring Network) in a large diverse US population (NY-NJ Metropolitan Area), across multiple cohorts between 2006 and 2016. Data was restricted to 1) children identified as ASD by the surveillance, 2) have a clinical ASD diagnosis after age 30-months. Case data included: functional characteristics, evaluations and diagnoses, services by EIP and special education systems, as well as: demographic and related information determined through systematic analysis of information contained in professional evaluations. Descriptive statistics are provided and linear regression models, adjusted for sociodemographic (sex, race/ethnicity, socioeconomic status) and clinical factors (intellectual ability and degree of impairment), were utilized to identify associations.

Results: Overall, 4050 8-year-old children were identified with ASD between 2006 and 2016. Of those, 2,607 met the study criteria. Diagnosis age ranged from 30 to 107 months. Median age of ASD diagnosis was 54 months; however, median age of ASD diagnosis among EIP participating children was 49 months compared to 62 months for non-EIP participating children. After adjusting for sex, race/ethnicity, socioeconomic status, comorbid intellectual disability, and degree of impairment, average age of ASD diagnosis among EIP participating ASD children was 41 months, while average age of ASD diagnosis among non-EIP participating ASD children was 53 months. Additionally, in our model ASD diagnosis age did not vary by sex or race and ethnicity but varied by socioeconomic status, the presence of intellectual disability, and degree of impairment.
Conclusions: EIP- participating ASD children received the diagnosis 1-year earlier than non-EIP participating children (41 months vs. 53 months), even after adjusting for multiple covariates. The findings show that EIP participation facilitates early ASD diagnosis. Additionally, our findings show that EIP participation reduces race-based disparities in ASD diagnosis age; however, income disparities remain evident even when we account for EIP participation. Early diagnosis of ASD and EIP participation may be advanced by universal autism specific screening, between 18 and 36 months.

413.209 (Poster) Predictive Utility and Degree of Correspondence between Parent- and Examiner-Reported Concerns for ASD and ADHD in the First Years of Life

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Background: Autism spectrum disorder (ASD) and ADHD commonly co-occur, with research suggesting shared developmental pathways (Johnson et al., 2015). While parent concerns for ASD by 12 months of age have been associated with eventual diagnosis (Ozonoff et al., 2009), research on early ADHD concerns and their relation to ASD is sparse. The degree of correspondence between early parent and clinician concerns is also unclear.

Objectives: We examined parent- and examiner-reported concerns (PC/EC) for ASD and ADHD between 12-36 months among infants developing ASD or elevated ADHD symptoms in a sample enriched for both outcomes. We also explored PC/EC correspondence.

Methods: This study included n=225 infants with an older sibling with ASD (ASD-risk, n=116), an older sibling/parent with ADHD (ADHD-risk, n=52), or ≥1 typically developing sibling and no family history of ASD/ADHD (low-risk, n=57). Participants were enrolled no later than 18 months (89.3% by 12 months) and followed prospectively at up to 4 visits, depending on enrollment age (12, 18, 24, 36 months). At the final visit, participants were classified into one of 3 outcomes: ASD (DSM-5 diagnosis), ADHD Concerns (elevated symptoms), or Comparison (i.e., not meeting criteria for ASD/ADHD Concerns). At each visit, PC were elicited by a standardized interview; EC were rated at the end of the visit. Concerns were coded into pre-defined categories by trained examiners. For each respondent (examiner, parent), communication, social, stereotyped behavior, and unspecified autism concerns were combined into an “ASD concerns” composite. Concerns about hyperactivity, impulsivity, and/or inattention were combined into an “ADHD concerns” composite. Generalized estimating equations compared PC/EC from 12-36 months based on 36-month outcome. Spearman’s correlations assessed correspondence between PC and EC.

Results:

The effects of outcome, visit, and their interaction on PC-ASD were significant (ps<0.003, Figure 1). The ASD group had higher PC-ASD and EC-ASD than the other two by 12 months, persisting through 36 months. The ADHD Concerns group had higher PC-ASD than the Comparison group at 36 months and higher EC-ASD relative to Comparison group from 18–36 months. For PC-ADHD, only the effect of outcome was significant (p=0.037) with marginally higher PC-ADHD in the ADHD Concerns group relative to the Comparison group (p=0.05). For EC-ADHD, the effects of outcome, visit, and their interaction were significant (ps<0.009). There were no group differences at 12-18 months, but the ADHD Concerns group had marginally higher EC-ADHD at 24 months relative to the Comparison group, and higher EC-ADHD at 36 months relative to the other two groups. Correspondence between parent and examiner ASD concerns were stronger compared to ADHD-related concerns, though still significant for the latter between 18-36 months (Table 1).

Conclusions: Examiner concerns about ASD in infancy are associated not only with an eventual ASD diagnosis but also with ADHD Concerns outcomes in the absence of ASD by 18 months. Examiner (but not parent) concerns for ADHD at 24 months were associated with ADHD Concerns outcomes by 3 years. Further characterization of these concerns, and whether degree of correspondence relates to eventual outcome, may facilitate earlier identification for ASD and ADHD.

413.210 (Poster) Early Joint Attention Behaviors in Infants at High Familial Risk for Autism Spectrum Disorder: Association with Brain Development

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Background:

Autism Spectrum Disorder (ASD) is a heritable neurodevelopmental disorder that includes deficits in social communication and interactions, as well as the presence of deficits in restricted and repetitive behaviors. Early signs of ASD can be detected in the first year of life, and impairments in early social gaze and Joint Attention (JA) are one of the earliest indicators of later ASD diagnoses. JA is
characterized by the ability to follow the gaze of others and share common interests with other individuals or objects. In individuals with an ASD diagnosis, the ability to initiate JA (IJA) can be more impaired than the ability to respond to JA (RJA).

Objectives:

In this study, we aimed to examine behavioral measures of Joint Attention and the association between subcortical brain volumes, and ASD diagnosis in infants with a familial risk for ASD.

Methods: In this longitudinal study, data from 101 high-risk infants (62% males) were collected as part of ACE Study and IBIS Network from the National Database for Autism Research (NDAR). Infants underwent MRI scans at either 4 or 6 months of age, or both. Using Infant FreeSurfer, subcortical volumes from the thalamus, the hippocampus, the amygdala, the basal ganglia, the ventral diencephalon, and the cerebellum were automatically extracted. Behavioral data from assessment tools such as the Vineland Adaptive Behavioral Scale-II (VABS-II) and the Autism Observational Scale of Infants (AOSI) were used to examine early gaze and JA behaviors. Using Principal Component Analysis, data from both assessment tools were classified identifying 5 components. Two components related to JA, responding to joint attention (RJA), and initiating joint attention (IJA), were identified, and used for further analysis. The other three components that described visual tracking and auditory processing were excluded.

Results:

It was found that the majority of infants were IJA non-responders (n=93, 92%), and over half were RJA non-responders (n=50, 52%). For both non-responder groups, models accounting for age, sex, and total cerebral volumes tested the association among subcortical volumes with later ASD diagnosis. Using a regression method, it was found that, in the non-responder IJA group, subcortical volumes of the left hippocampus (B=-0.009, aOR=0.991, p=0.025), the right thalamus (B=-0.016, aOR=0.984, p=0.026), as well as the left thalamus (B=0.015, aOR=1.015, p=0.019) were predictive of later ASD diagnosis. In the non-responder RJA group, no associations amongst brain volumes and later ASD diagnosis were found.

Conclusions:

Findings suggest that brain regions such as the thalamus and hippocampus may be more vulnerable early in life. The absence of IJA and altered subcortical development may be key predictors of later ASD development. A better understanding of early signs of social gaze and JA in infants with ASD familial risk as well as the neural mechanisms underlying those behaviors could aid in identifying intervention targets and biomarkers to promote improved social and behavioral outcomes.

413.211 (Poster) Early Language-Specific Developmental Differences in Young Children with and without Autism.

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Background:

The state of the art about autism poses important unsolved questions, such as the heterogeneity in the onset, clinical presentation and developmental trajectories of the condition. Early language development is particularly affected by this heterogeneity and it is a fundamental predictor of longer-term outcomes.

However, although global domains of language such as lexical, morphosyntactic, semantic and pragmatic have been studied in relation to language proficiency, very limited studies, with relatively small sample sizes, have explored, the early precursors of speech in a developmental framework and through a fine-grated qualitative and quantitative perspective.

Objectives:

For this reason, the paper aims to explore language heterogeneity in autism under the lens of early expressive language development, by using a detailed micro-analytic system, within a naturalistic setting of parent-child play interaction.

Methods:
We conducted a cross-sectional analysis of speech (vocalizations, words) and pragmatic functions (request, denial, declarative) in a sample of 30 children with and without autism (N=15 per group, 8 F). Children with TD were matched according to the developmental age of the autistic child, aged 12 to 48 months. All the children were tested using a naturalistic paradigm of free parent-child interaction (PCI). The PCI was video-recorded for a 10-minute time and the video footage was analyzed using an open-source behavioral annotation tool for audio and video recordings, which allows an unlimited number of textual annotations, supports creation of multiple tiers and tier hierarchies (ELAN). Speech production, both vocalizations and words were annotated and their pragmatic function identified. 

Results:

Results showed that, although the two groups are similar in terms of total amount of speech, they significantly differ in terms of speech repertoire (i.e. the proportion of vocalizations and words over the total speech production). Compared to the TD group, the ASD group: (i) produced significantly fewer words (W(30)= 84, p= .015); (ii) produced significantly more vocalizations (W(30)=76, p=.030); (iii) produced speech mainly for expressing the pragmatic function of request, while the TD children used significantly more words for declarative purposes (W(30)=85, p=.005).

Conclusions:

Speech production during naturalistic play interaction and from a developmental perspective in young children with and without autism was investigated using a microanalytic quantitative and qualitative approach. Our results highlight, since very early development, the language gap and the impairment in social sharing and declarative function in autism. Delays and atypicalities in early speech production can provide novel and predictive behavioral markers of an autism condition, very early on, contributing to dissecting autism language heterogeneity.

413.212 (Poster) Early Motor Features Successfully Decode Autism Spectrum Disorder: Findings from a Longitudinal Study through Parent Questionnaire

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Background:

Early motor impairments have been reported in children with autism spectrum disorder (ASD), but it is unclear how early such impairments might be detected. Tracking motor development through reliable and inexpensive tools is strategic in the clinical and research fields. Findings on motor development may contribute to the early diagnosis of ASD and thus hasten referral for early intervention.

Objectives:

To investigate whether a parent-report measure of motor development might effectively predict the developmental outcome of infants at high risk (HR) for developing ASD

Methods:

The Italian Network for early Detection of autism spectrum disorders (NIDA Network) is the largest multi-center and multi-disciplinary network aimed to guide observational studies and surveillance programs for the early detection of ASD and neurodevelopmental disorder (NDD). The NIDA Network has enrolled 1436 HR infants (890 siblings, 328 infants born preterm, 218 small for gestational age) and 120 low risk (LR) infants. The Early Motor Questionnaire (EMQ), a parent-report measure of motor development, has been administered as part of a wider clinical evaluation protocol at 6, 12, 18, 24, and 36 months (mth). EMQ is an easy to complete 3 sections (gross motor, fine motor, and perception-action integration skills) parent-report. EMQ motor scores of 17 LR infants with typical development were compared with 150 siblings grouped according to their clinical outcome at 24-36 months [14 HR infants with ASD diagnosis (HR-ASD); 20 HR with other NDD diagnosis (HR-NDD); 118 HR with typical development (HR-NoDiagnosis)].

Results:

ANOVA analyses showed that HR-ASD and HR-NDD infants had lower EMQ scores compared to LR infants (HR-ASD vs LR, p< 0.001 at 18, 24, 36 mth; HR-NDD vs LR, p < 0.01 at 18, 24 mth). Significant differences were observed for EMQ total and subscales scores (perception-action integration skills at 18, 24, 36 mth, gross motor and fine motor skills at 24, 36 mth). HR-NoDiagnosis and LR infants did not differ at each time point. The area under the curve (Receiver operating characteristic ROC curve analysis) for EMQ total scores predicting ASD outcome was 0.83 (at 18 mth) and 0.84 (at 36 mth), whereas NDD outcome was 0.86 (at 18 mth) and 0.84 (at 36 mth).
Conclusions:

The motor skills of HR infants diagnosed with ASD and NDD early differed from LR infants typically developing. EMQ scores moderately/highly discriminated HR infants later diagnosed with ASD or NDD from LR infants already at 18 and 24 months. The EMQ parent-report of motor development might be effective in predicting the diagnostic outcome of HR infants earlier than the clinical diagnosis confirmation. EMQ may be an informative, helpful, and low-cost tool to early detect neurodevelopmental outcomes. In the future, EMQ can be also a valuable remote telehealth approach for the early assessment of HR infants.

413.213 (Poster) Early Signs of Autism in Infants with TSC Is Associated with Reduced Language Production and Nonverbal Communication during the Second Year of Life


Background:

Tuberous sclerosis complex (TSC) is a rare, multisystem genetic disorder which presents a considerably increased risk for autism, with up to 60% of infants with TSC meeting the criteria for an autism diagnosis by 3 years of age. TSC can also have pervasive effects on cognitive, behavioural, intellectual and psychosocial development. Given that autism is characterised by receptive and expressive language impairments and reduced nonverbal communicative skills, we might expect to observe such delays in infants with TSC. Despite this, very few studies explore autism emergence in TSC, and whether impaired verbal language and communication is linked to early signs of autism. Diagnosis of TSC before the onset of atypical socio-communication allows for prospective investigation of autism emergence, and may inform the development of targeted interventions.

Objectives:

We aimed to explore: (1) whether early autism traits present on or before 24 months of age in infants with TSC, and (2) whether group differences (TSC versus typically developing infants) in early language/communication skills are associated with autism emergence.

Methods:

Data were collected as part of the Early Development in Tuberous Sclerosis Study, which prospectively tracked development of infants with TSC (n=32) and typically developing (TD) infants (n=34). Standardised parent report questionnaires, interviews and child observational measures were administered at 3, 5, 8, 10, 14, 18 and 24 months old. Verbal language skills were measured using Macarthur Communicative Developmental Inventories (MCDI) which generated vocabulary production and comprehension scores at 10, 14 and 24 months old. Mullen Scales of Early Learning (MSEL) verbal developmental quotients for expressive and receptive language were collected at all time points. Nonverbal communication was measured using MCDI early gestures scores. Developmental ability (a covariate) was measured using the Mullen Scales of Early Learning composite score. Early autism traits were measured using the Quantitative Checklist for Autism (Q-CHAT) at 10, 14 and 24 months old at outcome.

Results:

Infants with TSC demonstrated higher Q-CHAT scores at 14 months (p=.004), 18 months (p=.006) and 24 months old (p=.01) compared to TD infants. Lower language production scores were found in TSC infants, and at 14 months (p=.019) and 24 months old (p=.005) they predicted Q-CHAT scores at 24 months old, however this effect was not present when controlling for developmental ability. No association was found between language comprehension scores and Q-CHAT scores. Verbal developmental quotients were lower in TSC infants compared to TD infants from 10 months old (p<.001). Reduced early communicative gestures were observed in the TSC group at 14 months (p=.01) and 24 months old (p=.004), and both were associated with Q-CHAT scores at 24 months old. There were no group differences in gesture use at 10 months old.

Conclusions:

Early signs of autism were consistently observed in TSC infants from 14 up to 24 months old, which supports earlier autism screening in TSC. Reduced language production and nonverbal communicative skills from 14 months old predicts later autism emergence in infants with TSC, however should take into account developmental ability when defining early markers of autism.
**413.214 (Poster) Early Social Communication Skills in 12-Month Old Infants with Sex Chromosome Trisomy (SCT): Results from the Extraordinary Babies Study**

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**Background:** Sex Chromosome Trisomies (SCT) including Klinefelter/XXY, XXX, and XYY syndromes occur in approximately 1:500 births. SCTs are associated with broad spectrum of neurodevelopmental outcomes, including increased risks for developmental delays, speech-language and learning disorders, executive dysfunction, anxiety disorders, social deficits and autism spectrum disorder (ASD), with studies showing ASD rates ranging from 12-35%. Preliminary studies of toddlers with SCTs show evidence of early deficits in language and social communication, although more systematic study is needed from infancy. The eXtraordinarY Babies Study is a natural history study of health and neurodevelopment in infants with a prenatal diagnosis of SCT, and aims to identify early predictors of poor neurodevelopmental outcomes in SCT, including early predictors for a later diagnosis of ASD.

**Objectives:** To describe the profile of early social communication development in the SCT population, and to evaluate the relationship of social communication skills to neurodevelopmental skills.

**Methods:** A subset of 56 participants with confirmed SCT diagnoses (XXY=43, XYY=4, XXX=9) from the eXtraordinarY Babies Study were evaluated using the Bayley Scales of Infant and Toddler Development-3, and the ADOS-2 Toddler Module at 12-months of age. Analyses were limited to those who completed the assessments prior to COVID19 mask/shield requirements. ANOVA with post-hoc Tukey analysis was used to compare demographics and Bayley-3 subdomain scaled scores between SCT conditions (XXY, XYY, and XXX), and one-tailed T-tests compared to normative sample. Proportions of 0, 1, and 2 scores on ADOS-2 social affect and restrictive/repetitive behavior items were calculated and ranked, and algorithm total scores for each domain were correlated with Bayley-3 subdomain scores.

**Results:** There were no significant differences in demographics or Bayley subdomain scales between SCT groups. Bayley-3 results showed lower Receptive Language (scaled score 8.2±2.4), Expressive Language (8.9±3.0), and Gross Motor (7.9±3.0) scores compared to normative sample, while Cognitive (10.8±1.9) and Fine motor (9.3±2.3) domains did not differ. High rates of delayed or atypical development of early social communication skills were identified, with >75% showing scores of 1 or 2 in frequency of babbling, spontaneous vocalizations, gesture use, and pointing. 58% of the sample showed unusual eye contact and facial expressions directed to others. Participants showed few restricted and repetitive behaviors. Results of ADOS-2 total scores: Little-no concern 50%, Mild-Moderate concern 35.7%, Moderate-severe concern 14.3%. No one was assigned a clinical diagnosis of ASD. Receptive language scores negatively correlated with ADOS-2 Social Affect (r= -.38, \( p < .001 \)) and Overall Total (r= -.41, \( p < .001 \)).

**Conclusions:** Even at an early age, toddlers with SCT are at increased risk for language, communication, and social delays. While no participants were diagnosed with ASD at 12 months of age, social communication and reciprocal social interaction deficits or “red flags” for later diagnosis of ASD were seen in a subset of young children with SCT and correlated with receptive language skills at 12 months. Prospective follow-up will allow us to determine the trajectory of these deficits and whether findings at 12-months of age predict later social communication deficits and ASD diagnosis.

**413.215 (Poster) Emotion Regulation and Family Risk Factors in Young Children with Autism**


**Background:**

A growing body of research has emerged exploring the role of emotion regulation (ER) in autistic children. ER refers to any process that a person uses to influence the onset, magnitude, duration, intensity, or quality of one or more aspects of an emotional response. ER research shows that autistic individuals generally present more ER difficulties than non-autistic persons and are less effective at using ER strategies (e.g., avoidance or distraction). Less is known about ER of very young autistic children. More research is needed to better understand ER in young autistic children and its potential association with family risk factors.

**Objectives:**
The objectives of the study were to (1) Identify whether significant differences exist between autistic and non-autistic children (12-72 months) in ER and to (2) Investigate whether family risk factors (i.e., maternal education, family income, family status) are related to children’s ER skills while simultaneously considering autism diagnosis.

Methods:

The sample consisted of 94 children aged 12-72 months, including a group of 41 autistic children matched on age with a group of 53 non-autistic children. Children’s ER skills were evaluated using the French version of the Emotion Regulation Checklist, a parent report questionnaire. Each item on the scale is rated from 1 (rarely) to 4 (almost always) and greater scores indicated greater ER skills. The level of familial risk was calculated from self-reported sociodemographic information completed by mothers. Factors such as maternal education, family income and family status (nuclear family, single parent household, etc.) were combined to create a composite score representing the level of familial risk. To answer aim 1, the group difference in ER was calculated using a one-way analysis of variance (ANOVA). For aim 2, a multiple regression was used to investigate if familial risk and diagnosis status (0= control group, 1=autistic group) predict ER skills.

Results:

Autistic children had significantly lower ER skills ($M = 2.64, SD = .41$) compared to non-autistic children ($M = 3.37, SD= 0.28; p < .001; \eta^2 = .52$). The overall regression model was statistically significant and explained 53% of ER skills in the sample, $R^2 = .53, F(2,83) = 49.6, p < .001$. The presence of familial risk negatively predicted ER skills ($\beta= -.17, p = .028$), whereas having an autism diagnosis negatively predicted ER skills ($\beta= -.684, p < .001$).

Conclusions:

This study adds to the current literature showing that young autistic children present less developed ER skills compared to non-autistic children. Importantly, familial risk predicted ER skills even when considering autism diagnosis. More research is needed to understand the role of family risk on ER, and whether other variables may account for variations in ER skills in autistic children (e.g., intellectual disability).

413.216 (Poster) Examining Parent-Infant Interaction Trajectories in Infants with and without an Elevated Likelihood for Autism – a Replication Study

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Background: It has been suggested that developmental antecedents of autism may bidirectionally affect parent-infant social interactions, amplifying social skills difficulties (Dawson, 2008; Elsabbagh & Johnson, 2007). Previous research using a sample from the British Autism Study of Infant Siblings (BASIS) found differences in several areas of parent-infant interaction for 7 and 14 months with lower ratings for infants with versus without elevated likelihood (EL) for autism (defined by having an older diagnosed sibling), and prediction of 3-year autism outcome based on 14-month interaction (in mutuality, positive affect and attentiveness; Wan et al., 2013).

Objectives: We sought to replicate previous work by Wan and colleagues in a more recent, larger sample to examine the consistency and predictive value of the parent-infant interaction aspects in relation to autism likelihood and later autism outcome (infants at EL with and with no autism outcome, EL-autism, EL-no autism; infants at typical likelihood, TL).

Methods: Using the Manchester Assessment of Caregiver-Infant Interaction (MACI) global rating scales, we evaluated 6-minute videotaped laboratory-based unstructured parent-infant free-play interaction in a larger independent prospective cohort from the BASIS at 8-10 (100 infants at EL, 24 infants at TL) and 10-15 months (104 EL and 26 TL infants). Coding was blind to participant information. Assessment of autism outcome was conducted at 36 months.

Results: Linear mixed-effects models replicated previous findings showing significant differences in parent sensitive responsiveness, parent non-directiveness and dyadic mutuality ($ps<0.004$) between the autism likelihood groups (EL-no autism, EL-autism, TL) with scores on these variables being lower in the EL-autism group compared to the other two groups. Additionally, an age-by-group interaction effect showed that infant attentiveness to parent decreased from 8 to 14 months in the EL-autism group compared to the other two groups ($p=0.02$). 14-month infant attentiveness to parent and mutuality predicted autism outcome; this also replicated previous effects. We failed to replicate the group effects in infant liveliness, positive affect and dyad engagement intensity. Furthermore, we found earlier (8m) predictive effects of autism outcome in infant positive affect and parent nondirectiveness ($ps<0.02$) than reported by Wan et al.
Conclusions: This study strengthens the existing evidence base for emerging alterations in parent-infant interaction, starting from 8 months, especially among infants subsequently diagnosed with autism. These robust longitudinal analyses of the largest sample to date measuring parent-infant interaction to 3-year diagnosis reinforce the predictive value of parent-infant interaction qualities and suggest divergence in attentiveness to parent from 8 months, not seen in the previous 7-month sample. Further work should examine whether changes represent an affirmative parenting style, or could provide options for supportive interventions.

413.217 (Poster) Examining the Profile of Visual Attention Eye-Tracking Markers in Children and Their Association with Autism Traits and Child Development


Background:

Visual attention is a key gateway for learning during early development, and which may show an altered trajectory in autism. Objective markers of visual attention have been identified using eye-tracking technology in infants and children; individual markers have been associated with specific autistic traits. Eye-tracking offers the potential to objectively observe developmental trajectories before the appearance of overt behaviours. Investigating multiple measures from eye-tracking tasks can improve our understanding of the underlying structure of cognitive processes, and how they may be associated with child development and autism traits.

Objectives:

We aim to: 1) examine the underlying structure of visual attention with multiple measures from a battery of eye-tracking tasks in children at 3 years; 2) Identify groups of children with similar visual attention patterns across eye-tracking tasks; 3) Investigate whether visual attention profiles are associated with child development and autism trait measures.

Methods:

Data from 120 children at 3 years were analysed, from STAARS: a cohort including children with an elevated likelihood of Autism Spectrum Disorder and/or Attention Deficit Hyperactivity Disorder, by virtue of having a first degree relative with a diagnosis. Measures from four eye-tracking tasks were included in the analysis: fifty faces (ff – dynamic social stimuli), pop out (pop – static social stimuli), non-social contingency (ns), gap-overlap task (gap). Structural Equation Modelling (SEM) examined the underlying structure of visual attention. Latent profile analysis (LPA) then identified sub-groups of children with similar visual attention patterns across tasks. Multiple regression models investigated whether these visual attention profiles were associated with: 1) child development (Mullen ELC); and 2) autism trait scores (ADOS-2 CSS).

Results:

The SEM model was estimated with two latent factors, social attention and exogenous orienting (RMSEA = 0.077 (CI = 0.047-0.105, p = 0.068); CFI = 0.945; TLI = 0.925; c² (48) = 81.59, p = 0.002). For the LPA, a five-profile solution was chosen (Figure 1); profiles were described as: (1) “High Social Attention”, (2) “Fast Exogenous Orienting”, (3) “Low Social Attention”, (4) “Slow Exogenous Orienting”, (5) “Slow Exogenous Orienting and low social attention to dynamic stimuli”. Multiple regression revealed that slow exogenous orienting was associated with higher Mullen scores (R²=0.31, F(7, 94)=6.14, p<0.001). Further, profiles showing “High Social Attention” had significantly lower Social Affect ADOS scores than all other profiles (AdjR²=0.15, F(7, 94)=2.4, p=0.027).

Conclusions:

The underlying structure of visual attention measured using eye-tracking markers from multiple screen-based tasks conducted with children at 3 years, and based on previous models of visual attention, confirmed two latent constructs: Social Attention and Exogenous Orienting. Five-profiles of visual attention were identified from this cohort that primarily varied in social attention and exogenous orienting, thus further confirming these as underlying constructs of visual attention. Both constructs were associated with childhood autism trait scores (social attention eye-tracking profile), and developmental measures (exogenous orienting eye-tracking profile). By identifying subpopulations based on eye-tracking markers from multiple domains, and further investigating their association with cognitive development and autism traits, could ultimately enable us to provide more individualised and tailored support within sub-populations.

413.218 (Poster) Executive Dysfunctions in Toddlers with ASD: A Brief-P Profile
Background:

Children with Autism Spectrum Disorders (ASD) often have impaired Executive Function (EF) skills. This concerns problems in the domains of inhibition, emotional control, initiation, working memory, planning and organizing, and monitoring, with the most profound problems in cognitive flexibility (Blijd-Hoogewys et al., 2014). Little EF research has been done in toddlers with ASD. While their EF problems are linked with lower social, communication, and daily living skills (Powell et al., 2022).

Objectives:

The present study aimed to investigate whether a specific BRIEF-P score profile can be found in toddlers with ASD. The BRIEF-P is a parent-completed questionnaire that screens for EF-problems in daily life.

Methods:

Retrospective BRIEF-P and other diagnostic data from a clinical sample of 201 toddlers with ASD (n = 147 boys, age: M = 3.65 years, SD = 0.87 years; n = 54 girls, age: M = 3.80 years, SD = 0.94 years) were analyzed. The norm group from the original Dutch BRIEF manual was used as a reference group. Mean T-scores of the research group were compared to a mean T-score of 50, a subclinical elevated T-score of 60 and a clinical elevated T-score of 65.

Results:

The internal consistency of the BRIEF-P total score was excellent (Cronbach’s α = .942); and good for the clinical scales (Inhibition, Cronbach’s alpha = .887; Shift, Cronbach’s alpha = .843; Emotional control, Cronbach’s alpha = .893; Working memory, Cronbach’s alpha = .879), except for Plan/Organize, which had an acceptable internal consistency (Cronbach’s alpha = .799).

Autistic toddlers had (see Table 1), compared to the BRIEF-P norm group, elevated scores (T > 50) on all clinical scales for both the total group and for boys/girls separately (p < .001, Cohen’s d = .850-1.627). They had clinical elevated scores (T-score > 65) for Shift (boys: p < .004, Cohens’ d = .222; girls: p < .001, Cohens’ d = .567) and borderline clinical elevated scores (T-score = 60-65) for Inhibition (boys: p < .001, Cohens’ d = .291; girls: p = .002, Cohens’ d = .416). Concerning Emotional control, girls had clinical elevated scores (p < .001, Cohens’ d = .708), boys had borderline clinical elevated scores (p < .001, Cohens’ d = .363). Concerning Working memory, boys had borderline clinical elevated scores (p < .001, Cohens’ d = .317).

Conclusions:

There was a BRIEF-P profile obvious in toddlers with ASD. Their parents reported the most pronounced EF problems in cognitive flexibility. Also, inhibition problems were obvious. This is in concordance with findings from older children with ASD.

Parents reported more pronounced emotional control problems in girls with ASD. This is consistent with the clinical impression that girls with ASD are more likely to evidence emotion regulation problems. Also, often the primary referral reason for seeking diagnostic assessment in toddler girls and not immediately a suspicion for ASD.

Note that most findings concern small effect sizes, expect for the findings concerning cognitive flexibility and emotional control in girls with ASD, which concerned medium effect sizes.

413.219 (Poster) Exploring the Relationship between Child Attachment, Parent Child Interaction and Parental Reflective Functioning: Preliminary Results from DAN-PACT Pilot Study


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Background: The social communication problems in children with autism may impact the quality of parent-child interactions. Parents’ sensitivity to the child’s atypical communication pattern, through parental reflective functioning and achievement of synchronicity may
improve parent-child interactions. This may also nurture secure attachment in younger children with autism. Relationships between child attachment, parental reflective functioning and parent-child interaction measures such as synchronicity in dyadic communication have not yet been investigated in parent-child dyads in children with autism. Results from the baseline assessment in a pilot study of the intervention Paediatric Autism Communication Therapy will be analyzed and presented.

Objectives: This study aims to explore the relationship between child attachment security, parental reflective functioning, and measures of parent-child interaction such as synchronicity in dyadic communication in children with autism.

Methods: Participants were 18 parent-child pairs recruited from child and adolescent psychiatric hospital units in Denmark after the child had received a diagnosis of autism spectrum disorder (pervasive developmental disorder according to ICD-10 criteria). The parents filled out the questionnaires Parental Reflective Functioning Questionnaire (PRF-Q), and Maternal Perception of Child Attachment (MPCA). The PRF-Q includes three subscales reflecting different aspects of mentalizing: 1) Pre-mentalizing Modes, 2) Certainty about Mental States and 3) Interest and Curiosity in Mental States. Twelve-minute playtime sessions between parent and child were videotaped to assess parent-child interaction using the Dyadic Communication Measure of Autism (DCMA). The DCMA is scored by a certified rater on three areas of interaction: parental synchronicity in communication, child initiations and mutual shared attention. The mean age of the children, 17 boys and 1 girl, was 4.4 years (range 2.7-6.4 years). The parents in the playtime videos were seven fathers and eleven mothers.

Results: In this underpowered pilot-sample there was a positive correlation with a moderate effect size (0.36), p=0.15 between parental synchronicity in DCMA and parents’ perception of child attachment (MPCA). The linear regression of DCMA synchronicity and MPCA results in a regression coefficient of 1.86 with SE 1.21 and 95% CI (-0.72 ; 4.43), p=0.15 (Fig. 1). This is consistent with previous research in normative samples indicating parental sensitivity as a mediator of secure attachment. There was no immediate correlation between neither of the three subscales of PRF-Q and parental synchronicity, e.g., PRF-Q Certainty in Mental States and DCMA synchronicity correlation (-0.15), p=0.55. More analyses of the data will be presented on the poster.

Conclusions: The study indicated a correlation between child attachment and parental synchronicity in communication. No association between parental synchronicity and parental reflective functioning was found in this sample of parent-child dyads. Given the small sample size this is not surprising. We look forward to gaining deeper insights into these explored relationships when more data becomes available with the completion of the DAN-PACT trial.

Figure 1 Linear regression of DCMA parental synchronicity as independent and MPCA as dependent variable

413.220 (Poster) Factors Contributing to a Change in Diagnosis from 24 to 36 Months in Younger Siblings at Elevated Likelihood of Autism Spectrum Disorder

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Background: Autism spectrum disorder (ASD) is a heritable developmental disorder, with higher rates of ASD in families with older affected sibling(s). Earlier screening is beneficial for younger siblings at elevated likelihood (EL) of ASD, as 86.3% of cases diagnosed before 36 months maintain an ASD diagnosis over time (Rondeau et al., 2011). The remaining false positive participants often have co-morbid disorders which benefit from early intervention (Greene et al., 2021). On the contrary, false negative rates can reach over 40% in EL samples which poses a problem for accessing necessary services (Ozonoff et al., 2015). Assessing children with these borderline phenotypes, we investigated phenotypic trends at 24- and 36-months which might influence final diagnostic outcome in order to minimize future misdiagnoses.

Objectives: Identify the phenotypic characteristics driving diagnosis change from 24- to 36-month evaluations.

Methods: EL younger siblings (n=63) completed 24-month (Mage(SD)=24.44(±1.00) months) and 36-month (Mage(SD)=37.46(±2.09) months) assessments. Clinician best estimate (CBE) of diagnosis was made using: (1) Autism Diagnostic Observation Schedule-2 (ADOS-2); (2) Mullen Scales of Early Learning (MSEL); and (3) overall diagnostic impressions (Lord et al., 2012, Mullen, 1995). CBEs from 24- and 36-month appointments were collected to generate four independent groups: (1) true positive, ASD CBEs (TP, n=18); (2) true negative, non-ASD CBEs (TN, n=33); (3) false negative CBEs (FN, n=7); and (4) false positive CBEs (FP, n=5). Influence of ADOS-2 sub-scores [social affect (SA) and restricted and repetitive behavior (RRB)] and MSEL sub-scale scores [visual reception (VR), fine motor (FM), receptive language (RL), and expressive language (EL)] on CBE change were determined by between group ANOVAs and Bonferroni-corrected multiple comparisons.

Results: There was a significant effect of 24- and 36-month ADOS-2 sub-scores (all p<0.001) and MSEL sub-scale scores (all p<0.036) on CBE change. FN participants had significantly lower SA and RRB scores than TP participants at 24 months (p_{SA}=0.001, p_{RRB}=0.010) and significantly higher SA and RRB scores and significantly lower EL scores than TN participants at 36 months (p_{SA}=0.003, p_{RRB}=0.001, p_{EL}=0.033). FP participants had significantly higher SA and RRB scores than TN participants (p_{SA}=0.032, p_{RRB}=0.004) at 24 months and
Background: Previous studies have shown atypical gaze patterns in autistic individuals during video viewing: they gaze less on-screen and show larger within-group heterogeneity in gaze patterns than typically developing individuals. Also, autistic individuals do not fixate typically to social content of videos, including faces.

Objectives: We investigated whether atypical gaze might be evident already in prodromal autism. We focused on gaze patterns to social and non-social videos in toddlers divided into two groups according to their ADOS-2 scores. We hypothesized that toddlers with high ADOS scores indicating more autism-related behavior tend to look more outside the screen, especially during social videos, and that there is more variability in gaze patterns within the high ADOS group. Finally, we ran an explorative analysis to investigate the epochs within videos where gaze similarities differ most between groups.

Methods: We recruited 32 toddlers (20 males, mean age 18 months, range 13–31 months) in the longitudinal Gaze@Toddler study (Tampere University, Finland) from child welfare clinics. Eye-tracking data and ADOS-2 ( toddler module) were obtained during their first lab visit. We divided the participants into high (N=15, total ADOS ≥13 points) and low (N=17, total ADOS <13 points) ADOS groups. Participants passively viewed a video stimulus consisting of eight video clips from Finnish-language children's TV shows. Four clips had social content (people, conversation), and four had non-social content (vehicles, animals). We compiled the video clips into a single video (dur. 5:10min) with an abstract fixation video (dur. 2.5s) for recalibration between each video clip. Participants were seated on the caregiver's lap while watching the videos on a 27” screen placed at a 60cm distance. We investigated the effects of ADOS group membership (high vs. low) and video category (social, non-social vs. fixation) on percentage of gaze on screen with a 2 x 3 mixed-effects ANOVA. To investigate the within-group similarity of gaze patterns, we used 1-s-long non-overlapping time windows to calculate dynamic inter-subject synchrony during the videos using pairwise gaze heatmap correlations. We estimated group differences in mean inter-subject correlations for each clip using Cohen's d and bootstrapping to estimate distribution parameters.

Results: High ADOS scores were associated with less gaze on screen (F(1,30)=8.27, p=.007, η^2=.22; M_high=71.7%, SD_high=14.6%; M_low=85.2%, SD_low=7.9%). Groups also differed in the effect of video category on the percentage of gaze on screen (F(2,60)=5.17, p[HF]=.009, η^2=.15): low ADOS group gazed more on screen during social videos than during fixation or nonsocial videos, but this effect was absent in the high ADOS group. Low ADOS group had higher within-group gaze synchrony during both social and nonsocial videos (Table 1), indicating more homogeneous gaze patterns. We identified higher synchrony within the low ADOS group to scenes with people and intentional actions, and higher synchrony within the high ADOS group during scenes with objects (Figure 1).

Conclusions: Overall, toddlers with high ADOS scores look less on the screen and show more heterogeneous gaze patterns than toddlers with low ADOS scores. Our longitudinal study will follow gaze pattern development in larger samples with diagnostic outcome.
Background: Early detection of ASD is essential for initiating support and minimizing cascading negative effects on development. Psychophysiological responses to direct gaze might serve as one potentially useful predictive marker of ASD in young children. Previous study by Helminen et al. (2017) showed that while young, 2 to 5-year-old children without ASD show stronger heart rate deceleration response to gaze shifts to direct vs. averted direction, a similar physiological orientation response is not seen in young children with ASD.

Objectives: The objective was to investigate heart rate orientation responses in toddlers with prodromal ASD to faces vs. objects, and to gaze shift to direct vs. averted direction. Specifically, we wanted to investigate whether toddlers showing different levels of ASD-related symptoms differ in their orientation responses.

Methods: Participants of this on-going study were 20 toddlers (Age $M=18.95$ months, $SD=4.47$), who were screened positive with the parent-report screening tool (M-CHAT-R/F). They were recruited in Gaze@Toddler (Tampere University, Finland) study from child welfare clinics. Toddlers were divided into two groups according to their ADOS-2 toddler module score; lower ($M=11.2, \text{Range}=6-15, N=13$) and higher symptoms group ($M=23.3, \text{Range}=20-26, N=7$). Toddlers were presented with dynamic pictures of faces (direct and averted gaze directions) and clocks on a computer screen. Heart rate (bpm) change between prestimulus baseline (-500 to 0 ms) and stimulus presentation (0 to 3000 ms) was analyzed in 500-ms intervals.

Results: Preliminary analysis (Stimulus X Time X Group ANOVA) revealed a significant three-way interaction, $F(2.8;50.7)= 3.95, p=.015, \eta^2_p = .180$. This interaction was explained by the Low ADOS group showing stronger heart rate deceleration to faces vs. cloks while the high ADOS group showed a stronger heart rate deceleration to clocks vs. faces (Fig 1 & 2). No other significant effects were found. Analysis showed no statistically significant effects of gaze direction (Gaze Direction X Time X Group ANOVA) on the strength of heart rate orientation responses in the two groups.

Conclusions: Preliminary results indicated stronger orienting response to objects than to faces in toddlers with higher level of ASD-related symptoms while toddlers with lower level of symptoms showed stronger orienting response to faces. Gaze direction was not found to have an effect on the strength of orienting response. It might be that differences in orienting responses to gaze directions are not seen at this early stage of development, but larger sample, also including toddlers with no signs of prodromal ASD, is needed to clarify this conclusion. Also, the effect of age needs to be studied more closely. However, the preliminary findings suggest that orienting responses to faces vs. objects, regardless of gaze direction, might aid in early detection of ASD together with other sources of information such as parental concern and other early markers. Further investigation of this area will be conducted as a part of the longitudinal Gaze@Toddler -project. Data collection of both, prodromal ASD and control group (typically developed toddlers screened negative on M-CHAT-R/F) is currently in progress.

413.223 (Poster) Higher Prevalence of Autistic Features in Children with Agenesis of the Corpus Callosum Compared to Familial High Likelihood Children


Background: Agenesis of the Corpus Callosum (ACC), a congenital disorder in which the corpus callosum is completely or partially absent, occurs in ~1 in 4,000 live births. ACC has been identified as a major risk factor for autism spectrum disorder (ASD). Although 35%–45% of children and adolescents with ACC may ultimately meet screening criteria for ASD, there are no published studies of early ASD screening (under age 4) with this population. The Parent Rated Observation of Communication, Emotion, and Social Skills (PROCESS) has been shown to be useful for predicting ASD outcome in children with familial high likelihood (HL) for ASD, but its utility has not yet been studied in children with ACC.

Objectives: We aimed to characterize the presentation of early autistic features in children with ACC at ages 18-24 months compared to HL children using the PROCESS. Additionally, we explored item-level differences that may be contributing to group differences on the PROCESS.

Methods: Parents of infants diagnosed with ACC and no other unrelated brain pathology completed the PROCESS for their children at ages 18 and/or 24 months ($n=75$). The familial HL group comparison data were obtained from a sample of 18–to 24-month-olds who had an older sibling with an ASD diagnosis ($n=588$). Mixed model analyses were conducted to test the effect of group (ACC vs. HL) as a predictor of PROCESS Total score as well as of two conceptually derived subdomain scores targeting social communication and restricted & repetitive behaviors. To investigate item-level differences between groups, a series of chi-square tests was run on the response category proportions for each item at the 18-month and 24-month timepoints.

Results: An effect of group (ACC vs. HL) on the PROCESS score was detected, such that children with ACC consistently scored higher than familial HL children ($\beta = -3.13, SE = 1.24, p = 0.021$). A similar pattern was seen at the subdomain level, such that the ACC group
scored higher than the HL group in both social communication ($\beta = -3.94$, SE = 0.91, $p < .001$) and restricted & repetitive behaviors ($\beta = -2.09$, SE = 0.54, $p < .001$). At the item level, items showing the greatest distributional differences between groups (in which the ACC group endorsed higher scores) involved visual tracking, eye contact, motor control, and use of gestures.

Conclusions: Compared to children at familial HL for ASD, 18- to 24-month-old children with ACC presented higher levels of parent-reported autistic features. Specifically, items with a visual or motor control component appear to contribute most to differences between the two groups. This may indicate that early motor and coordination delays, which are common in the ACC population, may underlie their higher PROCESS scores. More work is needed to parse which aspects of an ASD phenotype are shared between ASD and ACC, and which are specific to ASD.

413.224 (Poster) Using Factor Analysis and Mixture Models to Elucidate the Broad Autism Phenotype in Infancy


Background: Characterizing the broad autism phenotype during infancy may illustrate key targets of familial heritability prior to developmental, environmental, and stochastic processes that yield consolidated phenotypes in older individuals. One study made such an effort using the Autism Observation Scale for Infants (AOSI) in 12-month-olds (Georgiades et al., 2013). We sought to extend this work in the Infant Brain Imaging Study (IBIS) Network.

Objectives:

1. Evaluate the factor structure of the AOSI to determine whether the items map onto SC and RRB domains in a sample of infants at high- and low-likelihood for developing autism (total N = 523, of whom 308 were males).
2. Identify clusters or subgroups of infant siblings of autistic children who do not meet DSM criteria for ASD at 24 or 36 months (N = 396, of whom 216 were males), based on the factors derived from step 1.
3. Determine whether subgroups identified at 12 months differ as a function ASD-related symptoms at 36 months.

Methods: An exploratory factor analysis (EFA) specifying two factors was conducted on AOSI items. Social communication (SC) and restrictive and repetitive behavior (RRB) scores were then calculated by summing scores of the Items with significant loadings for factor 1 and factor 2. K means cluster analyses on these two normed variables were then completed specifying two, three, and four cluster solutions. Finally, we evaluated whether subgroups based on SC and RRB scores at 12 months varied as a function of 1) verbal developmental quotient (VDQ) and 2) nonverbal developmental quotient (NVDQ) from the Mullen Scales of Early Learning and 3) externalizing and 4) internalizing from the Child Behavior Checklist (CBCL) at 24 months.

Results: The EFA resulted in item loadings on two factors consistent with separate SC and RRB domains, and this solution ($RMSEA = 0.05$) fit as well as a one factor ($RMSEA = 0.059$) or three factor ($RMSEA = 0.041$) solution. In the subsequent cluster analysis, the four cluster solution fit the data best, with a higher Calinski-Harbasz statistic (431.87) than the three cluster (382.90) or two cluster (303.05) solutions. In each cluster solution, groups differed by both SC and RRB (smallest $p > 0.01$). In the best-fitting four cluster solution, clusters differed significantly on Mullen VDQ ($p = .031$), CBCL externalizing ($p = .046$), and CBCL internalizing ($p = .002$) and marginally on Mullen NVDQ ($p = .052$).

Conclusions: Findings from the EFA suggest that the AOSI is multidimensional, which aligns with the established SC and RRB symptom domains in ASD. These multiple dimensions may better index the broader autism phenotype than a unidimensional model, as evidenced by the subgroups derived from the two AOSI factors among children without an ASD diagnosis. Using longitudinal data, we validated the utility of these subgroups, showing that clusters differed not only in SC and in RRB at 12 months, but also in ASD-related symptoms at 24 months. Further work is still needed to elucidate the broader autism phenotype during infancy and the trajectory of development of ASD-related symptoms across groups.

413.225 (Poster) Early Developmental Pathways in Infants at Elevated Likelihood of Developing Autism: Towards an Innovative Biomarker Approach to the Study of Audio-Visual Sensory Integration

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Background:
Early identification of autism spectrum disorder (ASD) is crucial for the formulation of specific supports to be applied at young ages. The heterogeneity of ASD is expressed in individual variation not only in core symptoms but also in cognitive, language and behavioral skills, which show different trajectories. Moreover, there is strong interest in identifying reliable behavioral/brain-based predictors, which may constitute useful tools for detection of at-risk cases. Although it is well-known that autistic individuals perform poorly during conditions that require integration across multiple sensory modalities, as audiovisual integration (AVI), the study of AVI in early stages of life using experimental techniques is still scarce. Here, we report the findings of a large longitudinal study: we characterize the clinical outcome of our sample of infants at higher likelihood of developing autism (HL-ASD) and then provide early measures of AVI and their associations with clinical outcome.

Objectives: Specific objectives of this study include: (1) the characterization of clinical outcome in HL-ASD infants monitored from 6 to 36 months (2) the comparison of early AVI skills (measured by eye-tracking and EEG) in HL-ASD and typically developing (TD) infants, and (3) the association between early AVI and the clinical measure of infant neurodevelopment.

Methods:

HL-ASD (n=185) and TD infants (n=85) are monitored from 6 to 36 months with a multi-observational protocol including clinical and experimental measures (Figure 1a). Clinical outcomes were determined following the 36-month assessment (n=104, the recruitment is ongoing). Autistic children were classified if they had a clinical best estimate diagnosis of ASD by expert clinicians and an ADOS score above the clinical threshold. The non-autistic group was split into a typical and atypical group. A subgroup of the larger sample (n=54) underwent an experimental task (preferential looking paradigm) on AVI skills at 6-9-12 months. Infants' looking behavior was recorded using the Tobii ProSpectrum, and we calculated the proportion of total looking time for (in)congruent conditions in the two groups. A new experimental task on AVI integrating EEG/eye-tracking will be additionally presented (Figure 2b).

Results: Figure 1b shows the recurrence risk of ASD in our sample: the proportion of children in the three groups (ASD, typical, atypical) is shown for the whole sample and separated for males and females. Relating to the experimental task, ANOVA on looking time toward the mouth area of interest showed a main effect of Time-Point F(6,334)=27.67, p<.001 and of Group F(6,334)=13.24, p<.001. In both groups, looking behavior toward the mouth increased during development, and this pattern is stronger in TD infants (Figure 1b). Clinical measures will be available for all infants. Finally, future directions and preliminary data on the changes in AVI skills (measured by integrated EEG-eye tracking) following an early intervention in 18-month-old HL-ASD infants will be presented.

Conclusions: Future work should continue to investigate individual variability in AVI, potentially distinguishing between infants who later develop autism and those who do not receive a diagnosis. These findings may allow researchers to better understand (a)typical trajectories and clinical implications in the development of more individualized supports.

413.226 (Poster) Differentiating Early Sensory Profiles in Infants at Elevated Likelihood for Autism and Association with Later Socio-Communicative Skills
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Background:

Atypical sensory responses are included in the diagnostic criteria of autism spectrum disorder (ASD). It has been proposed that early differences in sensory responsiveness may produce “cascading effects” on later development. However, the relations between sensory processing and social communication in the earliest stages of development have not been well established.

Objectives:

The purposes of this study are (1) to evaluate the presence of different sensory profiles in infants at elevated likelihood of autism (i.e., infants with an older autistic sibling; EL-ASD) at 18 months of age and (2) to assess the potential association of the sensory subgroups and ASD-related traits.

Methods:

116 EL-ASD toddlers (males=56; females=60; age mean=17.33 months; SD=2.25) took part in the study. Inclusion criteria were: (1) gestational age ≥36 weeks, (2) birthweight >2000 grams, (3) Griffiths general quotient > 65, (4) absence of known medical, genetic or neurological conditions; (5) absence of major complications in pregnancy and/or delivery likely to affect brain development. Clinical measures of sensory processing (Seeking, Registration, Avoiding, Sensitivity) were measures by the Sensory Profile-2 Questionnaire (Dunn et al., 2014). To identify similar sensory subgroups, we used Latent Class Analysis (LCA) estimated in Mplus. In a longitudinal
framework, we also investigated sensory subgroups in relation to later socio-communicative skills and restricted/repetitive behaviors, as measured by ADOS Calibrated Severity Scores, CSS).

Results:

LCA defined three sensory subgroups (best fitting model, AIC=1079.477; BIC=1129.041; Entropy=.951): class 1 (n=65; 55.8%), class 2 (n=29; 25.7%), class 3 (n=22; 18.5%; see Figure 1). Interestingly, the results showed that only the subgroup with higher registration and sensitivity sensory scores (class 3) obtained higher socio-communicative difficulties at 24 months (F(2,100)=9.98; p<.001; ADOS Social Affect CSS: M=4.70, SD=2.83) compared to subgroup with lower sensory seeking scores (class 1: M=2.41, 1.49). No association were found between sensory groups and restricted/repetitive behaviors (F(2,100)=.599; p=.551; see Figure 2).

Conclusions:

This study supports that differences in sensory responsivity may be evident in infants with later social communication difficulties. These findings provide new insights into the nature of early sensory responsiveness and its association with later socio-communicative skills in early toddlerhood.

413.227 (Poster) Use of Multiple Biometrics during an Objective Paradigm to Evaluate Social Arousal in Infants


Background: Parents of infants who go on to develop autism spectrum disorder (ASD) report atypical sensory reactivity as early as 6 months of age. These reactivity, or arousal, patterns precede differences in social motivation and cascading deficits in social communication that are associated with ASD. Identification of objective markers of atypical arousal in infancy has the potential to re-envision early diagnosis and intervention.

Objectives: To evaluate the feasibility and validity of a novel paradigm developed to quantify arousal responses via multiple biometrics (pupillary, cardiac, and respiratory dynamics).

Methods: We developed the Stimuli for Early Social Arousal and Motivation in Infants (SESAMI) paradigm to evaluate multiple metrics of arousal to well-controlled social and non-social stimuli. Infants at low likelihood for ASD (no first degree relative with ASD) viewed SESAMI, while an eye tracker (Tobii Pro Spectrum) acquired gaze-tracking and pupillary dynamics, and a chest monitor acquired heart and respiratory data (Bittium Faros). SESAMI includes 9 trials of social (adult female face with speech) and non-social (pixelated, musical patterns that mimic human tones without the elements of speech) components. All data is validated and processed through an established pipeline that involves normalization to allow for comparisons across individuals and integration of available and valid data across trials. Time-series data are examined to evaluate the presence of unique social and non-social arousal patterns in infants.

Results: SESAMI pilot data has been gathered on 42 (98% success rate) infants between 6-24 months yielding valid arousal biometric data. Infants fixate on social faces more than non-social pixelated faces. Pupillary dynamics indicate that arousal responses are similar across social and non-social stimuli, highlighting the validity of SESAMI in eliciting well-controlled arousal responses. Distinct biometrics are not yielding significant differences between social and non-social stimuli and also have different onsets and durations during a stimulus presentation trials.

Conclusions: Arousal may provide the backdrop for how an infant samples information from and learned within a multi-sensory environment. The SESAMI paradigm may provide a new method to evaluate arousal biometrics in infants at risk for ASD, which can transform early diagnosis and intervention. The varied arousal responses across metrics highlights the need for analyses that integrate multiple time-series data to determine the utility of various metrics. Arousal biometrics are conserved across species, highlighting the utility of this work for preclinical models of ASD.
432.131 (Poster) How Do Infants with Later Autism Look at Other Children's Interactions?

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Background: When observing other people during naturally paced and dynamic interaction, it is essential to look at the most informative locations at the right time. While viewing interactive social scenes, both children and adults with autism have been found to orient less towards faces than typically developing peers (Rice et al., 2012; Rigby et al., 2016), which might be related to the difficulties understanding and anticipating others’ actions that have been found in autism (Schneider et al., 2013; Senju et al., 2010). However, few studies have focused on how infants or children view other children interacting. This is a common social situation for children who are observing siblings at home or spending time in childcare settings, a situation in which it is important for social development to attend to the actions of other children.

Objectives: To investigate the looking behavior when viewing other children interact in typically developing infants and infants with later autism.

Methods: The sample was part of a prospective sibling study, in which infant siblings of typically developing children and children with autism are followed into early childhood. The final sample consisted of 98 infants; 22 in the low-likelihood (LL) group, 60 in the elevated likelihood group who did not receive an autism diagnosis (EL-noASD group), and 16 in the elevated likelihood group who did receive an autism diagnosis (ASD group). They did an eye tracking task at 18 months of age and were assessed for diagnostic outcome at 36 months. We tracked the infants’ gaze while they were shown eight stimuli videos, consisting of two children interacting, where a boy reaches out for a toy and a girl refuses to give it to him. An earlier study using the same stimuli found that typically developing children look at the girl’s face shortly after the boy reaches for the toy (Falck-Ytter et al., 2013), presumably because the girl holding the toy decides what happens next, and looking at her facial expression might provide important social cues.

Results: The LL group showed an expected increase in ratio of looking at the girl’s face during a 2.5 second time window, starting one second after the reach for the toy, as compared to the 2.5 seconds before (t(21) = -3.337, p = .003). There was a significant group difference in the ratio of looking at the face of the girl during the time window after, but not before, the reach (F(2,91) = 3.698, p = .029), where the ASD group showed a significantly lower ratio of looking at the girl’s face, as compared to the other children.

Conclusions: This study suggests that when observing other children, infants with later autism may sometimes fail to look at locations that are maximally indicative of what is going to happen next. This may lead to altered information processing and may make it more difficult to predict, understand and learn from social interaction.

432.132 (Poster) How Infants Respond to Others’ Direct Gaze: A Prospective Study of Associations to Autism

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Background: Being looked at is an important and salient signal for typically developing infants. Attenuated behavioural responses to such direct gaze could be an early sign of autism spectrum disorder (ASD), yet this has not been tested empirically. This study is a follow-up based on our previous findings, reported in Nyström et al., 2017, but here we included ASD outcome.

Objectives: To investigate the looking behavior when viewing other children interact in typically developing infants and infants with later autism.

Methods: The sample consisted of 169 infants: 35 with elevated likelihood of ASD and subsequent diagnosis (EL-ASD), 94 with elevated likelihood of ASD without subsequent diagnosis (EL-notASD), and 40 with typical likelihood of developing ASD and no diagnosis (TL). At approximately 10-, 14-, and 18 months age we measured how much and how quickly infants looked back towards an adult’s face after the adult looked at them. The analysis was pre-registered.
Results:

Independent of age, ASD likelihood and subsequent diagnosis, all infants were likely to look more towards the adult’s face shortly after the direct-gaze event compared to before. Compared to the TL group, infants in both EL groups looked less towards the adult's face shortly after the adult looked towards the infant (TL - EL-ASD: t(157) = 2.01, p = .046; TL - EL-notASD: t(159) = 2.45, p = .015). Yet, neither how much nor how quickly the infants responded to other’s direct gaze differentiated between EL-notASD and EL-ASD groups at follow-up. Additional, explorative analyses indicated that infants with subsequent ASD diagnosis look away quicker from faces with direct gaze than infants without ASD.

Conclusions:

The current results suggest that infant direct-gaze responses, as operationalized here, are not clinically meaningful early markers of ASD. Instead, our results suggests that differences in this phenotype could reflect familial factors linked to neurodevelopmental conditions more generally, irrespective of the individual’s later development.

432.133 (Poster) How to Measure the Life of a Child: Optimal Sampling Strategies for Detecting Pivotal Transitions in Early Vocal Development in Infants with ASD

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Background: The recent availability of large data sets of densely sampled longitudinal measures collected from birth across multiple domains of infant behavior has provided compelling evidence that prodromal symptoms of autism emerge and can be detected within the first year of life by monitoring change over time in specific trajectories of development. Although gold-standard reference samples collected through years of research have finally provided the temporal resolution and statistical power needed to pinpoint significant changes in early development related to later outcome in autism, it is unlikely that intensive longitudinal designs developed for research will ever be appropriate or feasible for large-scale, cost-effective, community-viable screening. However, the information that cascades through the course of a child's development is not uniformly distributed. Dense uniform sampling over long periods of time may not be necessary if, with appropriate calibration from reference data, pivotal transitions can be localized using carefully chosen non-uniform subsamples. Accordingly, in this study we investigate new methods for systematically constructing sparse non-uniform sampling strategies for developmental profiling with equivalent performance to dense longitudinal designs.

Objectives: The goal of this research is to design and evaluate developmental sampling strategies that optimize detection of autism from trajectory biomarkers using sparse non-uniform sampling, in the context of early vocal development.

Methods: As part of an NIH Autism Center of Excellence (NIH P50 MH100029), we tracked vocal development in 40 children later diagnosed with autism and 40 typically developing controls, as part of a larger sample of more than 400 infants. Each child wore a LENA recorder one day every month from 0-24 months to provide audio recordings of their vocal environment. Using multitaper harmonic analysis, we identified the onset and offset of each infant and caregiver vocalization. From the mean rate of event markers, we determined an index of volubility for infant and caregiver; by calculating the transfer entropy between event marker sequences, we derived an index of infant-caregiver vocal contingency. Using Functional Data Analysis, we determined developmental trajectories for these measures for each infant-caregiver dyad, and mean trajectories for each outcome group. Permutation tests were used to identify significant (P<.05) differences between groups. We repeated our analysis using 10000 randomly selected subsamples of time points, and we determined the number and distribution of subsamples that continued to yield significant differences. We then used sparse coding techniques to reconstruct full developmental trajectories from these subsamples.

Results: Replicating our previous analyses, we identified significant differences in trajectories of vocal contingency within the first year, based on our full sample of up to 24 timepoints per child. Significant differences could still be detected in subsamples containing on average only 6 samples within 12 months, or 4 samples out to 18 months, with optimal performance from 3 samples centered around 12 months.

Conclusions: Sparse non-uniform sampling of infant development can be used to detect differences between autism and typical development with fewer samples than dense uniform designs, if the optimal sampling distribution can be derived from a densely sampled reference.

432.134 (Poster) Identifying Sex and Diagnostic Differences in the Emergence and Frequency of Social Smiling in Infants with and without Autism Spectrum Disorder through Parent and Clinician Reports

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Background: Social smiles emerge at around 1-2 months of age according to parental and experimental reports and are a fundamental milestone for social communication (Anisfeld, 1982; Messinger and Fogel, 2007). Smiling expression has been shown to diverge in atypically-developing infants: though at 6 months, frequency of smiling is comparable between children on the Autism Spectrum and their typically-developing (TD) peers, it declines significantly until 12 months of age (Ozonoff et al., 2010). Additionally, it has been shown that females with ASD have stronger non-verbal communication skills than males in childhood (Park et al., 2012). Retrospective parent reports and prospective clinical assessments may be valuable to understand the effect of diagnosis and sex on the emergence of smiling.

Objectives: To examine the relationship between primary caregiver-reported developmental milestones and behavioral characteristics at 9 months of age and indicators of autism risk at 12 months of age in a population-based birth cohort.

Methods: Participants included 109 children (66 females) from an ongoing longitudinal birth cohort study. At 9 months, primary caregivers completed the Survey of Well-being of Young Children (SWYC). The SWYC includes questions and cutoff scores for infant developmental milestones and behavior concerns (three subscales: Adaptability, Temperament, and Sleep). At 12-15 months, primary caregivers completed the First Year Inventory–Lite (FYI-Lite, v.3.1b), a parent report measure designed to identify children at possible risk for a later autism diagnosis. The FYI-Lite includes 25 questions from the full FYI and yields two subscales: Social Communication (SC) and Sensory Regulatory (SR). We hypothesized that the 9-month behavior ratings would be more sensitive to autism risk than the developmental milestone screening at 9 months. The SWYC behavior checklist and the FYI-Lite SR scale have thematically similar items (e.g., the SWYC asks how infants react to new people and the FYI-Lite asks about responses to new situations; both ask about infant sleep behaviors).

Results: In this sample, 52% of infants (n = 57) were classified as at risk on the developmental milestone questions on the SWYC at 9 months. Infants who failed the 9-month SWYC developmental milestone screener did not differ from those who passed the FYI SC (p >0.1) or SR (p >0.8) scores at 12-15 months. A moderate positive correlation (r = 0.22, p <0.05; Table 1) was found between the 9-month

Conclusions: The interaction effect of sex and diagnosis on the age of smiling emergence, whereby females on the spectrum smile earlier per parent reports and more frequently in clinical contexts than their male counterparts, may have implications on social compensation mechanisms in females on the spectrum, and on the divergent diagnosis rates between sexes. Future analyses may look at the interactive development of smiling with other milestones such as crawling, sitting up and first words, dimensional analyses using other diagnostic tools such as the Mullen Scales of Early Learning and Autism Diagnostic Observation Schedule, and the internal validity of retrospective parent reports over time.

432.135 (Poster) Infant Adaptability Associated with Autism Risk in the First Year of Life

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Background: Autism is not diagnosed until the toddler or preschool period or later. Yet identification of prodromal indicators of autism in infancy has the potential to open doors for early supports and interventions. Research on autism in infancy has often utilized enriched risk cohorts such as infant sibling designs. Tracking developmental trajectories of behaviors in relation to autism outcomes in general, population-based cohorts of infants will help identify early behavioral signs of autism risk in broader pediatric populations.

Objectives: To examine the relationship between primary caregiver-reported developmental milestones and behavioral characteristics at 9 months of age and indicators of autism risk at 12 months of age in a population-based birth cohort.

Methods: Participants included 109 children (66 females) from an ongoing longitudinal birth cohort study. At 9 months, primary caregivers completed the Survey of Well-being of Young Children (SWYC). The SWYC includes questions and cutoff scores for infant developmental milestones and behavior concerns (three subscales: Adaptability, Temperament, and Sleep). At 12-15 months, primary caregivers completed the First Year Inventory–Lite (FYI-Lite, v.3.1b), a parent report measure designed to identify children at possible risk for a later autism diagnosis. The FYI-Lite includes 25 questions from the full FYI and yields two subscales: Social Communication (SC) and Sensory Regulatory (SR). We hypothesized that the 9-month behavior ratings would be more sensitive to autism risk than the developmental milestone screening at 9 months. The SWYC behavior checklist and the FYI-Lite SR scale have thematically similar items (e.g., the SWYC asks how infants react to new people and the FYI-Lite asks about responses to new situations; both ask about infant sleep behaviors).

Results: In this sample, 52% of infants (n = 57) were classified as at risk on the developmental milestone questions on the SWYC at 9 months. Infants who failed the 9-month SWYC developmental milestone screener did not differ from those who passed the FYI SC (p >0.1) or SR (p >0.8) scores at 12-15 months. A moderate positive correlation (r = 0.22, p <0.05; Table 1) was found between the 9-month
SWYC Adaptability subscale ($M = 1.61, SD = 1.53$) and FYI-SR subscale average ($M = 1.91, SD = 0.49$). A simple linear regression further evaluated this association ($R^2 = 0.04, F[1,107] = 5.64, p = 0.02$) and poor Adaptability was a positive predictor of higher FYI-SR risk ($\beta = 1.79, p < 0.0001$; Figure 1).

Conclusions: At 9 months of age, behavioral characteristics may be more sensitive to autism risk than are delayed developmental milestones at that age. An unexpectedly high rate of failed screens was found on the SWYC milestone screener at 9 months; the context of the COVID-19 pandemic may have impacted parental responses in ways that are not yet understood. This is an initial analysis of data from a large longitudinal study of autism outcomes in a general birth cohort. The association of 9- and 12-months ratings suggest stability in infants’ responses to new people and situations. Results will help to refine planned models predicting 36-month autism outcomes.

432.136 (Poster) Investigating the Association between Proband ASD Affectedness and Younger Sibling Social Visual Engagement across the First Three Years of Development

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Background: ASD is a highly heritable neurodevelopmental condition. One in 3-5 younger siblings of individuals with ASD (proband) also receive an ASD diagnosis by the age of three (McDonald et al., 2020; Ozonoff et al., 2011). A recent study by Girault et al. (2022) linked early brain MRI phenotypes of ASD in younger siblings with proband ASD traits, representing one approach to investigate inherited genetic liability in ASD. Previous research identifies social visual engagement as a neurodevelopmental endophenotype for ASD and suggests patterns of social visual engagement are highly heritable (Constantino et al., 2017). However, social visual engagement has yet to be leveraged in studying the heritability of ASD traits within families. Furthermore, the degree to which genetic influence on social visual engagement varies over developmental time is unknown.

Objectives: To investigate heritability of ASD traits within families across development, we examine whether proband ASD affectedness is associated with the percent of time younger siblings spend looking at the eyes, mouth, and body (EMB) at 3, 4, 5, 6, 9, 12, 15, 18, 24, and 30 months of age.

Methods: With a sample of 122 proband-sibling pairs, the association between proband ASD affectedness–as indicated by scores on the Social Communication Questionnaire (SCQ), Autism Diagnostic Observation Schedule (ADOS-2), and Social Responsiveness Scale (SRS)—and patterns of social visual engagement in younger siblings (85 male, 37 female) was examined. EMB percent fixation, calculated using data collected from eye-tracking sessions, was used to index younger siblings’ social visual engagement. Linear regressions tested the predictive power of probands’ assessment scores on younger siblings’ EMB fixation at 3, 4, 5, 6, 9, 12, 15, 18, 24, and 30 months. Proband-sibling pairs were included in analyses if relevant proband assessment scores were available and the younger sibling completed an eye-tracking session at the appropriate time point.

Results: Results of sensitivity analyses in our sample indicate that for cross-sectional analyses detecting associations between probands’ level of affectedness and variation in social visual engagement in younger siblings, we are able to detect associations having medium effect size, $\rho \geq 0.3$, for SCQ-based levels of affectedness. Additionally, we are able to detect associations having medium to large effect sizes, $\rho \geq 0.43$, for ADOS-2 and SRS-based levels of affectedness. Subsequent analyses indicate possible associations between probands’ SRS total scores and younger siblings’ social visual engagement at months 4, 5, and 6; however, these findings must be interpreted with caution given results of sensitivity analyses.

Conclusions: Preliminary analyses indicate possible relationships between proband traits and younger sibling social visual engagement, but small effect sizes require additional analyses to support or reject this hypothesis. One important consideration is the diagnostic outcome of younger siblings, which is expected to produce variability in patterns of EMB fixation (Constantino et al., 2017). Moreover, because trends in heritability across development are of particular interest, time varying associations between trajectories of younger siblings’ EMB fixation and probands’ ASD traits will be analyzed to provide a temporally sensitive perspective on the genetic heritability of ASD traits within families.

432.137 (Poster) Investigating the Impact of Intervention Time on Development in African American Children with Autism Spectrum Disorder

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Background: Compared to non-Hispanic white children, African American (AA) children experience a persistent delay in receiving an autism spectrum disorder (ASD) diagnosis (Constantino et al., 2020). AA children with ASD also have double the likelihood of having co-
occurring intellectual disability (ID) (Meanner et al., 2021). It is thus imperative for AA children to receive comprehensive assessments and interventions as early as possible. Prior studies have yet to investigate the average amount of intervention time AA children receive per week post-ASD diagnosis and how this impacts development.

**Objectives:** Investigate the impact of intervention time on development among AA toddlers with ASD.

**Methods:** Participants included AA toddlers with ASD (n= 46, M_age(SD)=27.26 (4.65) months) enrolled in a longitudinal genetics study. Developmental skills at time 1 (T1) and at a follow-up visit (T2) 18 months later were assessed with the Mullen Scales of Early Learning (MSEL), Social Responsiveness Scale (SRS-2), and the Vineland Adaptive Behavior Scale (Vineland-3) which are standardized for developmental age. The Autism Diagnostic Observation Schedule (ADOS-2) was also performed. T1 and T2 intervention hours looking at therapies like speech-language therapy (ST) and occupational therapy (OT) were assessed by surveying caregivers using the ACE 3 Intervention History survey. The average amount of intervention time the participants received every week was assessed at T1 (i.e., from age 1 to T1) and at three time points post-diagnosis (i.e., from T1 to T2).

**Results:** Paired-samples t-tests were used to compare the toddlers at T1 and T2. Intervention ranged from 0-1.75 hours at T1 and 0-20.00 hours at T2. At T2, the toddlers received significantly more (t(45)=4.91, p<.001) intervention time (M_intervention(SD)=4.13(4.96)) compared to T1 (M_intervention(SD)=0.45(0.60)). There were no significant changes on the Vineland-3 or SRS-2. MSEL domain age equivalent scores were used to assess changes in the brief period between T1 and T2. These scores were significantly higher at T2. Visual reception increased from 17.62(SD=5.82) months to 30.59(SD=1.41) months (t(36)=7.09, p<.001). Fine motor increased from 18.93(SD=5.17) months to 31.48(SD=11.38) months (t(41)=9.60, p<.001). Receptive language (RL) increased from 12.05(SD=6.97) months to 24.95(SD=13.98) months (t(41)=6.35). Expressive language (EL) increased from 13.08(SD=6.99) months to 25.94(SD=14.04) months (t(38)=6.99, p<.001). ADOS-2 total and social affect scores were significantly (t(25)=2.72, p=.012; t(25)=3.48, p=.002, respectively) lower at T2 (M_ADOS2(SD)=19.08(5.58); M_ADOS2(SD)=14.04(4.52), respectively) than T1 (M_ADOS2(SD)=21.62(5.10); M_ADOS2(SD)=16.81(3.80), respectively). Within-group correlations showed more ST and OT hours were positively associated with increased RL(r=.393, p=.029; r=.736, p=.001, respectively) and EL(r=.384, p=.033; r=.719 p=.002, respectively) t-scores at T2.

**Conclusions:** Findings suggest that increased intervention time can aid in comprehensive development in AA children with ASD. Specifically, ST and OT significantly improved language development. Given the benefits from a modest increase in intervention post-diagnosis, it is probable that an increase would result in even greater gains and reduce the burden of ID. Given that the average amount of intervention received was less than 5 hours/wk and the average recommended by the American Academy of Pediatrics (Hyman et al., 2020) is 20-25 hours/wk, more effort is needed to ensure children are receiving adequate intervention to help them reach their potential.

**432.138 (Poster) Link between Early Intervention Program Participation and Use of Preschool Disability Services By Children with Autism Spectrum Disorder**

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**Background:** In New Jersey, interventions are provided to preschool-age children with disabilities including autism spectrum disorder (ASD) under the auspices of the preschool disability (PSD) classification for special education. Though PSD services are universally available through local school districts, little is known about the utilization of the PSD (intervention) system by children with ASD. In addition, it is unknown to what degree an ASD child participating in Early Intervention Programs (EIP), a federally mandated program focused on children ages 0-36 months with disabilities and/or developmental delays, impacts linkage to PSD services.

**Objectives:** The study objectives were to determine the extent to which ASD children received PSD services in New Jersey and to identify factors affecting the utilization of PSD services. The influence of EIP participation, sociodemographic and clinical factors on PSD receipt were assessed.

**Methods:** Five consecutive cycles across a decade (2006-2016) of active population-based ASD surveillance by the New Jersey Autism Study (NJAS) focused on 8-year-olds with ASD from Essex, Hudson, Ocean, and Union counties. A two-phase ascertainment method was used. First, relevant information was reviewed and abstracted from medical and educational evaluations. Then, experienced clinicians using a reliable, DSM-referenced, and comprehensive method scored and analyzed the case information and determined ASD status. Demographic variables, including sex, race, and socioeconomic status (SES), were considered, along with clinical features, including intellectual status and degree of impairment as well as EIP participation. PSD participation was verified from multiple sources in the case record and referenced to EIP participation between birth and 36 months. Pearson Chi-square tests assessed differences between those receiving and not receiving PSD services. Standard logistic regression models were fit to examine the factors associated with PSD participation. Adjusted odds ratios (AOR) and 95% confidence intervals (CI) were estimated.

**Results:** 4050 8-year-old children satisfied ASD criteria. 2,667 (65.9%) received PSD services. Among children participating in EIP, 88.0% (n=1,661) received PSD services compared to 46.5% (n=1006) PSD participation by ASD children who did not receive EIP. No sex-based differences in PSD utilization were observed. SES was a significant factor in bivariate analysis, but was not significant when we adjusted
for covariates. Non-Hispanic Black children had higher odds of PSD utilization (AOR: 1.4; 95%CI: 1.1-1.8) compared to non-Hispanic White children. Similarly, Hispanic children had higher odds of PSD utilization (AOR: 1.3; 95%CI: 1.1-1.6) compared to Non-Hispanic White children. There was also variation in PSD utilization by county. After adjusting for multiple factors, EIP participation was strongly associated with the future receipt of PSD services (AOR: 8.7; 95%CI: 7.3-10.3). The proportion of ASD children receiving PSD services declined slightly, over time.

Conclusions: Two-in-three ASD children received PSD services, indicating a high rate of utilization. Slight decline in PSD utilization at the end of the study period suggests that maximum system capacity was being reached. Additional resources to the special education system for educating preschoolers with ASD are needed. EIP participation increased the odds of PSD service usage. Early universal use of an effective ASD screener may increase EIP participation and PSD enrollment.

432.139 (Poster) Measurement of Developmental and Behavioral Concerns in Young Children with Tuberous Sclerosis Complex

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Background: Tuberous sclerosis complex (TSC) is a genetic disorder caused by mutations in the TSC1 or TSC2 gene, which code for regulatory proteins involved in cell growth and division. The TSC phenotype often involves associated neuropsychiatric disorders (TAND), including autism, as well as medical complications, such as seizures. The TAND Checklist is a commonly used measure designed to assess the development and behaviors of individuals with TSC and impacts on families. This measure has been used to analyze and describe TAND phenotypic clusters of school-age children and broader age groups (de Vries et al., 2021; Alperin et al., 2021), but it is much less studied in younger populations. Here, we examine the degree to which the TAND Checklist is appropriate for use during the first years of life in children with TSC.

Objectives: To describe the utility of the TAND Checklist and characterize the areas of concern most commonly reported by caregivers in 12- to 36-month-old children with TSC.

Methods: Participants were enrolled in a larger early intervention study. Eligibility criteria included a clinical diagnosis of TSC and age between 12-36 months at entry. Data presented here are from the baseline visit (median age=23 months, n=53, 27 males). The TAND Checklist was collected via caregiver report. We separated participants into two age bins: 12-23 months (n=33) and 24-36 months (n=20) and examined patterns of response and non-response within the measure.

Results: Questions 1-5, which asked about milestones, current ability levels, behavioral concerns, psychiatric diagnoses, and intellectual development, had high response rates. Questions 6-9, which gathered data on academics, executive functioning, and impacts of TSC on daily life had lower response rates. The overall rate of concerns was higher in the 24-36 month cohort. The most commonly reported concern across both ages was absent/delayed onset of language (12-23 months=73%, 24-36 months=95%). Using the clusters from de Vries et al. (2021), dysregulated, overactive/impulsive, and ASD-like behavior were most common across both age groups, although more commonly reported among the older children (see Figure). Mood/anxiety concerns were more rarely noted at these younger ages. Open-ended responses revealed that top caregiver priorities were: communication and language skills (63%), mobility and motor skills (30%), behavioral/emotional management (26%), and daily living skills (26%). Behavioral/emotional management was primarily reported for the 2-year-olds, whereas mobility and motor skills were more frequently noted for the 1-year-olds.

Conclusions: While some question areas may be less relevant to younger cohorts, the TAND Checklist was found to provide meaningful information regarding early behavioral concerns and parent priorities, suggesting its general utility in clinical and research settings with younger children with TSC. Findings also reveal particular areas of need around early language development and behavioral regulation, highlighting the importance of further investigation of early interventions focused on these areas in TSC. We will continue to collect the TAND Checklist longitudinally in this cohort as part of the larger early intervention study.

432.140 (Poster) Monitoring Cognitive Development in Toddlers Using Automatic Eye-Tracking Based Technology

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Background: Treatment progress for individuals with ASD varies considerably. One challenge is the lack of adequate tools for objectively measuring progress in social and cognitive skills. These processes are mediated by how a child engages differentially with the surrounding environment, attending to relevant signals while disregarding those that are not.

Objectives: To test the hypothesis that a direct eye-tracking-based monitoring biomarker can be used to assess change in social and cognitive skills over time.
Methods: Data were collected as part of a larger longitudinal study at the Marcus Autism Center, with visits at 15-, 18-, and 24-months. To leverage a sample in which developmental progress can be expected, 28 TD toddlers with data from at least two visits (20 with two time-points, 8 with three time-points, comprising a total of 64 visits) were included in analysis. Toddlers watched four video scenes of unscripted social interactions (Figure 1A) while undergoing eye-tracking. Time-varying kernel density estimation was used to quantify visual fixation and scanning patterns during each moment of collected eye-tracking data (Figure 1B-D). Using models previously validated (n=475) in a multi-site, prospective, double-blind clinical trial (Jones et al., under review), we used each child’s scan paths to calculate their 1) Social Disability Index (proxying ADOS-2 Total Scores, r=-0.70 [-0.75, -0.66]), 2) Verbal Learning Index (proxying MSEL verbal ability age equivalent scores, r=0.61 [0.55, 0.66]), and 3) Nonverbal Learning Index (proxying MSEL nonverbal cognitive ability age equivalent scores, r=0.60 [0.54, 0.66]). We hypothesized significant growth in the Verbal Learning and Nonverbal Learning Indices (processes that show rapid development in the first years of life) and no significant change in the Social Disability Index, as TD children should show low and stable levels of these values. We used linear mixed effects models to test these predictions.

Results: Children watched an average of 118.33 seconds of video during each session (range=30.77-177.03, SD=33.49). The Verbal and Nonverbal Indices were sensitive enough to monitor the age-expected increases in these skills over time (Verbal: FE$_{Age}$=1.6, $\chi^2$=25.96, p=3.48e-7; Nonverbal: FE$_{Age}=2.06$, $\chi^2=35.95$, p=2.02e-9) (Figure 2). As expected, Social Disability Indices did not exhibit age-related change (FE$_{Age}=1.729$, $\chi^2=2.92$, p=.09), providing divergent validity for our eye-tracking-based monitoring biomarkers.

Conclusions: These findings provide evidence of convergent and divergent validity of our eye-tracking-based monitoring biomarkers. TD children are expected to show marked development in Verbal and Nonverbal learning; as hypothesized, there was significant growth in these Indices in the first years of life. As expected, there was no significant change observed in the Social Disability Index scores. It should be noted that an average of 118.33 seconds of eye-tracking data provided enough signal to monitor change in Verbal and Nonverbal learning over the first years of life. These findings have important implications for the development of objective treatment monitoring tools for children with ASD-related disabilities. Future work will validate these monitoring biomarkers in an ASD cohort undergoing treatment and compare rates of change in children whose clinicians reported significant improvements against those whose clinicians reported no significant improvement.

432.141 (Poster) Object Exploration and Fine Motor Skills in Infants at an Elevated Likelihood for ASD

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Background: While motor delay is not a core feature of ASD, growing research has identified a predictive association between early fine motor (FM) delays and later ASD outcomes (LeBarton & Landa, 2019). Infants at an elevated likelihood (EL) for ASD have demonstrated poorer FM skills by 6 months (Bhat et al., 2012), however, it is not yet understood the impact of this early delay on infant play and exploratory behaviors. FM skills, such as reaching and grasping, increase opportunities for a variety of object exploration behaviors. Object exploration plays a critical role in development as it enhances learning opportunities (Tamis-LeMonda et al., 2013) and increases word learning (Yu & Smith, 2012). If early FM skills enhance object exploration, this may be one pathway through which FM delays disrupt other domains of infant development and contribute to later ASD outcome.

Objectives: The present study aims to investigate the impact of early FM skills on concurrent object exploration and examine the predictive associations of these two constructs with later ASD symptoms.

Methods: Longitudinal data was collected at 6, 9, and 12 months from LL (n=49) and EL (n=35) infants. At 6 and 9 months, infants completed a 4-minute object interaction task followed by an assessment of motor skills using the Bayley Scales of Infant and Toddler Development (Bayley-3). At 12 months, infants were screened for ASD symptomology using the First Year Inventory (FYI) questionnaire. The object interaction was recorded and coded for exploratory touching and mouthing (Table 1).

Results: Multiple regressions were used to examine the relationship between 6- and 9-month Bayley-3 FM scores and concurrent object exploration across all participants. Model results showed that at both 6 and 9 months, FM skills were not associated with exploratory touching or mouthing ($p$'s>.05). Linear regressions were used to examine the associations between early motor measures and later ASD symptoms. Across all participants, FM skills at 6 months were significantly associated with 12-month ASD symptoms ($R^2=0.19$, $p<0.01$). This relationship was only significant in EL infants ($R^2=0.22$, $p<0.01$) and not LL infants ($R^2=-0.02$, $p=0.74$; Figure 1). At 9 months, this relationship was no longer significant for either group. No association was found between early object exploration and later ASD symptoms ($p$'s>.05).

Conclusions: No association was observed between early FM skills and concurrent object exploration. While previous studies have observed FM delays in EL infants, our results suggest that this does not diminish their quality of object exploration compared to LL infants. Similarly, FM skills, but not object exploration, at 6 months were negatively associated with later ASD symptoms at 12 months. This finding further builds on the established relationship between FM skills and ASD and suggests that object exploration does not follow a similar pathway to ASD outcome. Future studies could examine infant exploration of objects that require more refined FM skills, such as puzzles and blocks. This type of object exploration may be more dependent on the infant’s concurrent motor ability and play a larger role in...
Background: Majority of children with autism spectrum disorder (ASD) have language delay in their early development. Previous studies showed that early social communication skills, i.e., joint attention(JA), imitation, are associated with later language development in children with ASD, however, the results were inconsistent and most were from Western languages. Moreover, there were few studies examined these early predictive factors of language ability separately for children with high-functioning ASD (HFASD) and low-functioning ASD (LFASD).

Objectives: According to the heterogeneity in children with ASD, it is important to distinguish the different influential factors in language development between children with HFASD and LFASD. Therefore, the aim of this study was to investigate the role of JA and imitation in language development in children with HFASD and LFASD children respectively.

Methods: Participants included 99 children with ASD aged 18 to 35 months and were followed up (Time 2) 18 months after initial assessment (Time 1). Participants were divide into HFASD and LFASD groups by the Time 2-assessed developmental quotient (DQ) of 70. Screening Tools for Autism in Two-Year-Olds Taiwan Version (T-STAT) was modified to measure high levels of initiating joint attention (H-JJA), low levels of initiating joint attention (L-JJA), responding joint attention (RJA), object imitation and manual imitation. Mullen Scales of Early Learning (MSEL) was used to measure language ability, comprising receptive language, expressive language, and overall language.

Results: At Time 1, both HFASD and LFASD groups showed that RJA and receptive language, and L-JJA and expressive language were positively intercorrelated, respectively. At time 2, it was found that imitation ability was positively correlated to language ability in HFASD group, and LFASD group showed that receptive language was positively correlated to L-JJA and RJA respectively, and expressive language was positively correlated to RJA and object imitation respectively. After controlling chronological age, HFASD group showed that only Time 1 manual imitation predicted Time 2 expressive language, and LFASD group showed that only Time 1 RJA predicted Time 2 receptive language.

Conclusions: The current study included different types of JA and imitation to investigate their role of language development in children with HFASD and LFASD. Both children under 3 years old with HFASD and LFASD showed that RJA and IJA play a critical role in language ability. Furthermore, this study suggests that children with HFASD and LFASD may rely on different ways to enhance their language development: for children with HFASD, well-developed manual imitation is an important indicator of improving expressive language ability. This may show that imitation involved intentional social intention can help children with HFASD to express more well; for children with LFASD, they rely more on mapping strategies and understanding others’ communicative intention to acquire language knowledge. The current findings note the different directions of early intervention for children with ASD in different cognitive levels.

Predictors of Language Ability in Young Children with HFASD and LFASD in Taiwan
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Objectives: In this cross-sectional study we use the Social Responsiveness Scale-2 (SRS-2) to characterize social communication skills and restricted interests/repetitive behaviors (RRBs) in 3-4 year old children with ACC and a large community comparison sample.

Methods: Primary caregivers of n = 69 infants who had received a diagnosis of ACC completed the SRS-2 at 36 or 48 month timepoints (age range 33-50 months; M = 42.16, SD = 5.5; 39% female). The age-range matched comparison group represents a convenience community sample (n = 689; M = 44.1 months, SD = 5.5; 46% female) from three studies on early development. The SRS-2 provides results across multiple scales including Social Awareness, Social Cognition, Social Communication, Social Motivation and RRBs, as well as a total score.

Background: Agenesis of the Corpus Callosum (ACC), a congenital brain malformation in which the corpus callosum is partially or completely absent, occurs in ~1 in 4,000 live births. ACC has been identified as a major risk factor for Autism Spectrum Disorder (ASD). Although 35%-45% of children and adolescents with ACC may ultimately meet screening criteria for ASD, very little is currently known about social development or signs of ASD in early childhood. Currently there is no published information about how young children with ACC score on many of our most used measures of early ASD symptomatology. Consequently, there is a lack of guidance for pediatricians, neurologists, therapists and neuropsychologists regarding early assessment and optimal targets for intervention and treatment planning in this population.

Objectives: In this cross-sectional study we use the Social Responsiveness Scale-2 (SRS-2) to characterize social communication skills and restricted interests/repetitive behaviors (RRBs) in 3-4 year old children with ACC and a large community comparison sample.
Results: The ACC group had significantly higher raw scores than the community sample across all SRS-2 scales, as well as the total SRS-2 score ($p < .001$). See Figure 1 for box & whisker plots. When examining T-scores, the SRS-2 total scores for the majority of participants in both groups fell within the Normal to Mild range (77% ACC group, 98% community). However, a significantly greater proportion of ACC participants' SRS scores were in the Mild (13% ACC, <1% community), Moderate (3% ACC, 1% community) and Severe (7% ACC, <1% community) range.

Conclusions: Our study suggests that by ages 3 - 4, children with ACC are more likely to show early signs of social challenges and RRBs than a community sample. Given that there is initial evidence for early ASD behaviors in the ACC population on experimental measures, this study additionally provides initial support for using the SRS-2 to assess for early social difficulties in children with ACC. Longitudinal follow-up and a full diagnostic evaluation are the next steps in determining the predictive value of the SRS-2 in this medically complex population.

432.144 (Poster) Profound Developmental Delay Among Minimally Verbal Autistic Children
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Background: A hallmark of autism spectrum disorder (ASD) is the diversity in ability among autistic individuals, ranging from savant skills to profound disability. This can lead to complications in understanding ways to support autistic individuals, particularly for those at highest risk. Individuals with IQ’s below 50 and/or minimal expressive language form a group which will be identified as profoundly autistic by the age of eight and will likely need a lifetime of support. Due to the challenges of working with this population, little is known about their skills and challenges, resulting in a significant gap in our knowledge.

Objectives: Our objectives are to characterize autistic children at risk for profound autism.

Methods: This is a secondary analysis of 156 minimally verbal preschool age autistic children. Children were assessed using the Mullen Scales of Early Learning (MSEL), administered at the start of the study and after one year. The children completed the Early Social Communication Scales and the Structured Play Assessment, measures of social communication and play development. Children were filmed for ten minutes playing with a caregiver, and videos were coded for joint engagement and expressive language.

Results: At entry, 70% percent of the sample tested below the range needed to determine a valid early learning composite, the equivalent to an IQ score, on the MSEL. This subset of the overall sample we considered to be profoundly developmentally delayed. We explored the relationship between profound delay and measures of social communication, play, joint engagement, and expressive language. Accounting for the child's age, regression analyses showed a significant relationship between profound delay and child initiated joint attention ($p < .001$), play diversity ($p < .001$), joint engagement ($p < .01$), and number of distinct word roots (NDWR; $p < .001$). Autistic children with profound developmental delays were likely to have lower scores across all measures. Analysis of the profoundly delayed subset shows great variability. Child initiated joint attention ranged from 0 – 28, play diversity from 1 – 43, percent of time joint engaged from 0 – 92%, and NDWR from 0 – 34. At the 12 month follow up of the MSEL 58% of the sample continued to test in the profoundly delayed range.

Conclusions: Autistic children that also present with profound developmental delay are underrepresented in research. Seventy percent of the children in our sample did not score in the testable range of the MSEL, providing little information about skills and challenges. Assessments of core skills, such as joint attention, play, engagement, and language, provided a clearer picture of these children. While they were all more likely to score lower across domains, there is still great variability in their skills. High scores in child initiated joint attention and play diversity are important for target setting and have been shown to predict expressive language gains through intervention. Finally, 12 month follow up assessment showed that fewer children tested in the profoundly delayed range. Future work should examine factors that may predict these improvements or potential targets for early intervention.

432.145 (Poster) Pupil Dilation Indicates Atypical Physiological Reactivity to Facial Expressions during Late but Not Sensory Processing Stages in ASD
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Background: Individuals with ASD show atypical physiological reactivity to emotional stimuli. Underlying processes of these aberrations are unknown. Pupil dilation (PD) reflects sympathetic activation and can be used as a physiological measure for emotional arousal. PD time course components were suggested to reflect differential neural processes such as sensory vs. cognitive processing. Previous studies reported inconsistent findings on PD to emotional expressions in ASD, which may be a consequence of heterogeneous research.
Quantitative and Qualitative Analyses of Preverbal Production of Infants with High-Likelihood of ASD at 6 and 18 Months

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Background: Siblings of autistic children have higher likelihood of autism spectrum disorder (HL-ASD). Tracking their early vocal production allow 1) to describe early linguistic trajectories of HL infants with a later diagnosis of ASD (HL-ASD) at 24-months and those who don’t (HL-Neg) 2) to monitor early signs of atypical language development. In typical language development, the first preverbal milestones are expected to emerge around 6 months, and words and two-word combinations around 18 months. Researchers can rely on detailed analyses of the quality and quantity of these preverbal and verbal productions to investigate early (pre)linguistic development and describe individual trajectories.

Objectives: The present study, investigates whether at 6 and 18 months of age, infants with low likelihood of ASD (LL), HL-Neg infants and HL-ASD’ infants follow different trajectories in terms of total amount of production and type of production.

Methods: The present corpus correspond to two cross-sectional time-point (6-months: HL-ASD=3; HL-Neg=9; LL=18; 18-months: HL-ASD=11; HL-Neg=9; LL=19) from a longitudinal study following 55 infants with HL-ASD and 37 infants with LL-ASD between their 6 and 36 months. Infants’ vocal production are naturalistic data, recorded at home, without an experimenter. The hour the most “talkative” has been selected, for each infant, and manually coded with a detailed coding procedure (osf.io/y2jxm). Negative binomial regression models were used to assess diagnostic group differences.

Results: No group differences in total amount of production neither in type of production were detected at 6 months. There is no group differences either in total amount of production at 18 months. The variability in term of quantity of production is extremely heterogeneous (Table 1.). At 18 months, diagnostic condition has an effect on certain type of production. Vocalic preverbal production, Syllabic production and Proto-word production showed no group differences whereas HL-ASD and HL-Neg produced significantly less two-combination ($p$’s < .01) and single word ($p$’s < .01) than LL group.

Conclusions: Findings suggest that cross-sectional analyses, with few variables, are not enough to describe group differences and individual trajectories. Both HL-ASD and HL-Neg are incredibly heterogeneous and showed difference from LL group only for “verbal” categories of type of production. Analyses with more granularity (phonetic level) must be done on preverbal type of production. All
information from assessment that will be available when the follow-up of these infants will be over for everyone (VABS-II, MB-CDI, Leiter, CELF and ADOS) should also add precious information to describe each individual. Exploration of individual differences within-group from a longitudinal perspective is desired (Graph 1.). This is precisely the aim of the broader study from where these two samples are a part.

432.147 (Poster) Refining Computational Facial Analysis of Infants to Advance Early Autism Screening


Background: Computational analysis of infants' socially-directed facial expressions holds promise as a highly precise and scalable new avenue for early autism detection. However, existing computer vision facial analysis methods, developed on adult samples, have not been validated for infant facial morphology. Moreover, existing methods were largely developed for front-facing images, rendering them a poor fit for assessing infants in natural contexts. Evaluation of state-of-the-art methods by our team uncovered significant inaccuracies in measuring facial expression in the presence of head movement and in 3D estimates of individual morphology. Consequently, analysis of infants has been limited to basic head movements because faces cannot be adequately characterized. In response, we have developed novel methods that can digitally represent infants’ facial shape and separate head pose from facial expression. This study provides an initial validation as a critical step toward applying these methods to a large dataset of infants during natural social interactions.

Objectives: Validate new computer vision algorithms designed to accurately capture and parse facial structure, pose, and expression on infant video data.

Methods: 2D facial video data were collected from 130 ~12-month-old infants with (n=60) or without (n=70) a sibling with autism, during a 5-minute face-to-face interaction with a caregiver designed to elicit natural social behavior. From a subsample, 216 3-sec. video clips were selected in which there were no occlusions of the face or extreme deviations from frontal pose. 3D reconstructions representing facial pose and expression were generated for each clip as quantified by a robust 3D morphable model fitting method. Original clips and reconstructions were viewed side-by-side and coded for presence of 1) change in facial pose (i.e., head orientation movement) and/or 2) change in facial expression (i.e., movement in facial features). When a change was present, the accuracy with which it was captured by the reconstruction was rated from 0-3 (Very Inaccurate, Fairly Inaccurate, Fairly Accurate, Very Accurate). 30% of clips were double-coded – 15% to establish consensus and 15% for reliability.

Results: Interrater reliability (percent agreement) ranged from 69.6% to 90.6%. 164 clips were coded as containing a pose change, with a mean accuracy rating of 2.66 (SD=0.60). 156 clips were coded as containing an expression change, with a mean accuracy rating of 2.52 (SD=0.74). 121 clips contained changes in both pose and expression. Accuracy ratings for expression reconstruction were strong even when there was also a pose change (M=2.50, SD=0.75), suggesting the method can parse expression and pose – a difficult problem for computer vision that is especially critical to overcome for infant analysis.

Conclusions: Results suggest that our novel computational method accurately represents both facial pose and facial expression changes in infants as they engage in natural social interactions, even when pose and expression changes co-occur. Thus, it overcomes shortcomings of existing methods, which have hindered their vast potential for quantifying infant behavior. This work paves the way for future analyses on our large dataset of infant-caregiver interactions, aimed at deriving computational biomarkers of atypical development to be leveraged for earlier, more effective autism screening.

432.148 (Poster) Relationship between Sleep Habits and Behavioral Problems in 3-Year-Old Children, and Differences in Sleep Habits with and without Social Development Delay

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Background: Recently, there has been growing interest in the effects of children's sleep on their health and development. Children with sleep problems have more behavioral problems (Reynaud, 2018), and children with Autism Spectrum Disorder (ASD) have more sleep problems than without it (Johansson, 2018). Sleep habits differ between Western countries and Asia, and although interest in sleep habits has been growing in Japan, there are few reports of sleep habits in Asia.
Objectives: Therefore, our object in this study is to investigate the association between sleep habits and behavioral problems in 3-year-old children, and differences in sleep habits with and without social development delay (SDD).

Methods: Among the parents of 3-year-old children who underwent health checkups in a city in the Tohoku region in 2021-2022 and responded to a questionnaire, 1327 people who could be analyzed were included. We used the Child Sleep Habits Questionnaire (CSHQ) to assess sleep habits and the Child Behavior Checklist (CBCL) to assess behavioral problems. "14-item Social Development Screening"; cutoff value: 29 points, sensitivity 82.8, specificity 96.8, created by Hirosaki University from the Social Responsiveness Scale 2nd edition (SRS-2) and Strength and Difficulties Questionnaire (SDQ) was used to evaluate social development delay. All participants were examined for associations between sleep habits and behavioral problems. In addition, we examined differences in sleep habits between a group with social development delay (SDD group, n=154) and a group without social development (non-SDD group, n=1173). We used multiple regression analysis for statistical analysis, the χ² test and the Mann-Whitney test.

Results: As a result of multiple regression analysis (dependent variable: CBCL, independent variable: CSHQ), there was a moderate effect size association between total scores (β = 0.431, R² = 0.185). In other words, it became clear that sleep habit problems and behavioral problems were significantly correlated in 3-year-olds. In the subsections of CBCL and CSHQ, there were significant associations between sleep habits such as Sleep onset delay, Sleep anxiety, Parasomnias, and Sleep disordered breathing and behavioral problems such as Emotional reactive, Anxious/Depressed, Attention problems, Aggressive behavior, Internalizing, and Externalizing (Table 1). A chi-square test showed that the SDD group was significantly more likely to have some sleep problems (p<0.01). As a result of comparing the sleeping habits of both groups, the total score (p<0.001), each subitem; Bedtime resistance (p<0.01), Sleep onset Delay (p<0.001), Sleep duration (p<0.01). Sleep anxiety (p<0.05), Sleep disordered Breathing (p<0.001), and Daytime sleepiness (p<0.001) were all significantly higher in the SDD group. Therefore, children with social developmental delays were shown to have significantly more problems with sleep habits than children without delays (Figures 1, 2).

Conclusions: A community survey suggested a significant association between sleep habits and behavioral problems in 3-year-olds. Children with SDD also had more problems with sleep habits. It is also necessary to pay attention to the sleep habits of 3-year-old children with social and behavioral problems. In the future, we will further investigate sleep habits in ASD and other neurodevelopmental disorders.

432.149 (Poster) Sleep Duration and Sleep Challenges in Infants with Autistic Siblings

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Background: Evidence suggests sleep differences emerge in the first three years of life for autistic individuals (Horiuchi et al., 2020; MacDuffie et al., 2020). In order to understand sleep differences as a possible early indicator of ASD, it is important to determine the utility of different sleep data collection methods in infancy. Specifically, questions remain on the clinical utility of describing parent perceptions of their infant’s sleep challenges compared to tracking hours spent asleep.

Objectives: The current study uses prospective parent report to examine the how two different reports of sleep (sleep challenges and sleep duration) may be uniquely linked to future autistic traits among infants with an autistic sibling (elevated likelihood, EL) and those with no familial history of ASD (low likelihood, LL).

Methods: Participants (N = 71; EL, n = 32; LL, n = 39) were enrolled in a prospective longitudinal study on early autistic traits. At 6 months, caregivers completed the Infant Behavior Questionnaire Revised (IBQ-R) and a 24-hour sleep log. At 12 months, clinicians administered the Communication and Symbolic Behavior Scales-Behavior Sample (CSBS-BS: Wetherby & Prizant, 2003) and scored the Systematic Observation of Red Flags (SORF; Dow et al., 2016) from recordings of the CSBS-BS administrations. From the SORF, domain scores were calculated for social communication and restrictive and repetitive behaviors (RRBs). To measure sleep challenges, a new scale of Sleep Challenges was created with sleep-related items from the IBQ-R.

Results: At 6 months, EL infants (M = 5.12, SD = 1.70) spent significantly more time asleep during the day than LL infants (M = 3.87, SD = 1.21), (t(45) = 2.89, p < .01). There was no significant difference in time spent asleep at night or in the Sleep Challenges score between EL infants and LL infants. In examining the influence of sleep duration variables and likelihood status on the Sleep Challenge score, a multiple linear regression analysis was performed and found to be significant (F(3, 41) = 3.18, p = .03, R² = .19, R(adj) = .13). In this model, greater daytime sleep duration significantly predicted less sleep challenges (β = -.19, t(1) = -2.59, p = .01) while neither status nor nighttime sleep duration uniquely predicted the Sleep Challenges score. When assessing the role of status and sleep-related variables on future autistic traits in a general linear model, infants who spent less time asleep at 6 months demonstrated greater RRBs at 12 months (F(3, 10) = 15.26, p = .02), regardless of status. No association was observed when testing sleep challenges as a predictor or SORF social communication scores as the outcome.

Conclusions: The results of this study suggest that EL infants sleep more in the daytime at 6 months and increased daytime sleep predicts less sleep challenges in the overall sample. Findings of this study also indicate that reduced nighttime sleep at 6 months may signal future autistic traits. Additional research is needed to examine data collected from objective measures of sleep, such as actigraphy, and its
relationship to the etiology of ASD and related developmental outcomes.

432.150 (Poster) Sleep Patterns of Children with Prodromal Autism Spectrum Disorder

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Background:

During the prodromal phase of autism spectrum disorder (ASD), when behavioural symptoms begin to appear, sleep problems are a frequent concern of the parents. In general, sleep problems seem to get worse around 18 months of age when sleep starts to deviate from the normative sample. Studies in older ASD-children indicate that sleep difficulties such as reduced total sleep time are related to more severe symptoms. Understanding the sleep problems of prodromal ASD is essential so that support can be provided at the optimal time.

Objectives:

The aim of this study is to describe sleep problems in toddlers with prodromal ASD screened from the general population. We focus on sleep latency, night awakenings, time spent awake at night and the total night-time sleep duration. Another interest of this study was to investigate whether there is association between sleep patterns and autistic behaviour in children aged 12-24 months.

Methods:

Participants were recruited from on-going Gaze@Toddler -study in which toddlers are screened (M-CHAT-R/F) from the general population. Parents responded to a sleep questionnaire (BISQ & SDSC) about their toddler’s sleep. Within 1,5 months of completing the sleep questionnaire, children aged 13-28 months (N=23) were assessed with the ADOS-2 Toddler Module. The sample was divided into two categories; low (N=14, total ADOS < 16 points) and high groups (N=9, total ADOS ≥ 16 points) based on the median scores in total ADOS scores. The age was positively correlated (r= 0.597, p=.003) with the ADOS scores indicating that the toddlers with more autistic behaviour were older than the toddler with fewer ASD traits.

ADOS groups were compared to sleep latency, a number of night awakenings, time spent awake at night, and the total night-time sleep duration, and parents’ experience of the child’s sleep. We also compared the sleep patterns of children with prodromal autism to those of the general population at 12, 18, and 24 months old published by Paavonen et al., (2020).

Results:

The findings indicated that any of the sleep variables did not differ significantly between the high and low groups. There was a trend of significance (Fisher’s exact test, one-sided, p=0.06) indicating that the parents in high ADOS group reported their toddler having sleep problems compared to low ADOS group (Fig1). When toddlers’ sleep patterns were descriptively compared to the normative sample, the difference to the general population seemed to increase with age (Fig2).

Conclusions:

The preliminary findings suggest that sleep development deviates from average development during the second year of life in children with prodromal ASD. The parents of toddlers with clear autistic behaviour considered their toddlers to have sleep difficulties more often than the parents whose toddlers have milder autistic behaviour. The toddlers with clear ASD traits were also mostly over two years of age and this fact could partly explain our tentative finding. Nevertheless, it indicates that the parents need continuing support for sleep issues already before the formal diagnosis.

432.151 (Poster) Social Bids for Caregiver Attention in Infants at Elevated Likelihood for ASD

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Background: Young children with autism spectrum disorder (ASD) show significant differences in their initiations of social interaction compared to neurotypical children (Chiang et al., 2008). Previous studies suggest autistic children are less likely to socially engage in triadic interactions (child-parent-object) than typically developing children (Adamson et al., 2012); however, these findings have not yet
been studied in infants during a semi-structured interaction in which the caregiver intentionally withdraws their attention. The current study examines infant social bids to a caregiver whilst being ignored for infants at a genetically elevated likelihood (EL) for ASD and infants at low likelihood (LL) for ASD.

Objectives: This study aims to compare trajectories of social bids from 12 to 24 months between EL infants and LL infants.

Methods: At 12, 15, and 24 months of age, participants (n=21 LL, n=17 EL) engaged in a semi-structured triadic interaction. Caregivers were asked to play with their infant as usual for five minutes. Afterwards, caregivers were asked to sit back and ignore their infant (neutral face and avoid eye contact) for two minutes. Videos of this ignore period were coded for infant’s social bids towards their caregiver (based on definitions from the CSBS-BS). Social bids were studied using frequency scores for gestures, looks, and directed vocalizations. Effects of group and time were estimated using linear mixed models.

Results: All infants showed a significant effect of age on looks ($F(2, 57.13) = 5.86, p = .005$), gestures ($F(2, 60.55) = 8.13, p < .001$), and directed vocalizations ($F(2, 53.66) = 22.22, p < .001$), see Figure 1. A significant interaction emerged for gestures, with EL infants showing a faster rate of growth compared to LL infants, $F(2, 60.55) = 3.14, p = .05$. At 15 months, LL infants initiated marginally more gestures than EL infants ($t(29) = 1.95, p = .06$). There was no significant difference between groups at 24 months ($t(15) = -0.96, p = .35$).

Conclusions: Overall, EL and LL infants showed similar types and frequencies of social bids toward a caregiver when being ignored in a semi-structured interaction. All social bids increased over time from 12-24 months, regardless of status. The only differentiating feature between the groups was the frequency of gestures, where EL infants increased at a faster rate than LL infants. Intriguingly, 15 months was a critical time period, with EL infants producing fewer gestures than LL infants. By April 2023, n=10 participants will be added to the study, yielding final n=23 LL and n=25 EL, allowing additional stratification based on outcome. This study demonstrates that the quantity of social bids solicited by EL and LL infants is comparable between 12-24 months, suggesting that these infants were similarly aware of the social withdrawal and motivated to re-engage their caregiver. Additional research investigating the quality of bids, particularly for those with an eventual ASD diagnosis, may be helpful in understanding the complex picture of social awareness, motivation, and engagement in EL infants.

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**432.152 (Poster) Social Communication As a Predictor of Treatment Gains in Autistic Preschoolers: Examining the UCLA PEERS® for Preschoolers Program**


Background: Social differences are a core component of autism spectrum disorder (ASD; American Psychiatric Association, 2013), frequently evident in early development (Paul, 2003). Specifically, social communication is often impacted, such that autistic individuals might develop social language later or have sustained communication differences (Sterley, 2021). Only a few comprehensive social skills programs exist for young autistic children (DeRosier et al., 2011; Reichow & Volkmar, 2010). The PEERS® for Preschoolers Program (P4P) is an evidence-based social skills intervention that addresses multiple aspects of social skills and has been shown to improve peer interactions (Park et al., 2022). While various interventions have been found to increase social communication (Nowell, 2019), baseline social communication as a predictor of other social skills post-P4P has not been studied.

Objectives: This study aims to examine how social communication skills prior to P4P are related to and might predict treatment gains post-P4P. We hypothesized that preschool-aged children with higher social communication would show greater treatment gains.

Methods: Participants included 43 preschoolers (79% male; $Mage=4.6; SD=8.0$) who had completed P4P, all of whom had historical autism diagnoses and Social Responsiveness Scale, Second Edition (SRS-2; Constantino & Gruber, 2012) total scores $\geq 60$. Parents completed a battery of assessments pre- and post-intervention, including the SRS-2. This measure includes a total score and multiple subscales (i.e., social awareness, cognition, communication, motivation, and repetitive behaviors). Parents also completed the Social Skills Improvement System (SSiS; Gresham & Elliot, 2008), which has two main subdomains: Social Skills (SSiS-SS) and Problem Behaviors (SSiS-PB). Treatment gains were assessed using change scores pre- and post-intervention and Pearson correlations examined the relationship between social communication (measured on the SRS-2) and treatment gains.

Results: Paired samples t-tests indicated p-values from all SRS-2 subscales were significant when comparing baseline social communication and post-intervention subscales (all $p$ values $<.05$). Thus, there were gains in all SRS-2 subdomains. There were also significant correlations between baseline social communication and post-intervention SRS-2 total ($r=.48, p=.002$), social awareness ($r=.42, p=.008$), social cognition ($r=.47, p=.003$), social communication ($r=.45, p=.004$), and repetitive behaviors scores, ($r=.35, p=.029$).

However, the direction of the correlation indicated those with greater baseline social communication demonstrated higher post-treatment scores (i.e., more social difficulties). Significance was also evident between social communication and post-intervention SSiS-SS scores ($r=.43, p=.006$), where less baseline social communication difficulties also correlated with lower social skills.
Conclusions: Findings suggest baseline social communication is related to general treatment gains post-treatment in P4P, and all individuals benefited from this intervention. However, level of social communication is not a predictor of the magnitude of outcomes. Of note, P4P participants must speak in at least 4-word spontaneous phrases, which may decrease sample variation. Findings emphasize the importance of social communication in conjunction with other aspects of social skills targeted in P4P. Future research may examine additional domains as outcome predictors to better tailor the intervention to achieve the greatest benefits.

432.153 (Poster) Social Looking in Infants at Elevated Likelihood of Autism during Interaction with Parents
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Background: Diminished social interest or functioning is a key feature of Autism Spectrum Disorder (ASD), and reduced social motivation, manifested as lower attention to faces and other social stimuli, has been suggested to represent a potential starting point for later autistic symptoms (Chevallier et al., 2012; Dawson et al., 2004). For infants, the faces of parents provide rich sources of information, and diminished attention to these may lead to missed opportunities for learning and development. Whether ASD is associated with lower attention to faces in infancy is not clear (Chawarska et al., 2013; Elsabbagh et al., 2013), and whether autistic infants pay less attention to the faces of their parents specifically has yet to be assessed. However, using head mounted eye trackers, Yurkovic-Harding et al. (2022) found no differences in terms of parental face looking between young (24-48 months) children with and without ASD. In line with previous studies of typically developing children (e.g. Yu & Smith, 2013) both groups spent remarkably little of their time looking at their parents faces. While these findings are interesting, the possibility remains that differences exist earlier in development.

Objectives: The main aim of this study is to assess whether the frequency of spontaneous looking to a parent’s face during free play in 10-month-old infants is related to later ASD status. As not all included infants have yet reached 36 months and been clinically assessed, we currently report a comparison between infants at elevated vs. low familial likelihood of ASD. By the time of INSAR 2023 all infants will be diagnostically assessed. We then plan to present comparisons based on diagnostic outcome status (i.e. ASD vs. typical development).

Methods: At 10 months of age, infants were videotaped while playing freely with a set of toys with a parent. The first 5 minutes of play were video coded for instances of infant looking at the parent’s face. Frequencies of face looking were compared between infants at elevated likelihood of ASD and infants with no familial history of ASD (i.e. low likelihood).

Results: A preliminary analysis of 63 infants at elevated likelihood of ASD and 17 infants at low likelihood revealed more frequent face looking in the low likelihood group, M = 8.29 (per 5 minutes), SD = 5.96, compared to the elevated likelihood group, M = 4.98, SD = 4.25, p = .044.

Conclusions: Less parental face looking in the high likelihood group could be considered in line with the social motivation hypothesis (Chevallier et al., 2012; Dawson et al., 2004). However, whether reduced face looking is associated with diagnostic outcome remains to be seen once we have complete data. It is also possible that rather than being primary, the difference in face looking may be a consequence of other differences in interaction. It is noteworthy that in line with previous studies (e.g. Yu & Smith, 2013), both groups of infants directed rather few looks at the faces of their parents, perhaps contradicting the idea of infants as diligent observers of their parents faces.

432.154 (Poster) Sustained Joint Attention in Response to Expected and Unexpected Referential Gaze in Toddlers and Children with and without ASD: A Longitudinal Study
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Background: Difficulty with joint attention, an ability typically acquired by 12 months of age (Mundy et al., 2007) is one of the earliest signs of ASD. Toddlers with ASD exhibit basic gaze-following behavior at the end of the first year (Bedford et al., 2012). However, sustained joint attention (SJA, attention to gaze-cued objects) during toddlerhood is reduced and is associated with cognitive abilities and ASD severity (Bedford et al., 2012; Naber et al., 2008). To date, the early developmental dynamics of SJA in response to gaze direction cues in both predictable and informationally noisy environments in children with ASD remain understudied.

Objectives: To investigate SJA in response to expected and unexpected audio-visual referential gaze at 18, 30 and 42 months of age in children with typical development (TD), with developmental delay (DD) and with ASD. We hypothesize that SJA will increase over time in TD/DD children in the Expected condition, but children with ASD will evidence pervasively suppressed SJA at all ages. In the Unexpected condition, due to its greater cognitive-attentional challenge, SJA will be higher in TD compared to ASD/DD children.
Methods: 188 unique TD, DD and ASD children participated at 18, 30 and/or 42 months (Table 1). Gaze behavior was recorded during a video of an actress surrounded by 4 toys. After engaging in child-directed-speech and eye-contact, the actress exclaimed “uh-oh!” and gazed at one toy (Expected condition; 4 trials) or gazed at a toy on the opposite side of a moving toy distractor (Unexpected condition; 4 trials). (Chawarska et al., 2012, 2013). Age x group linear mixed models examined %SJA to the cued toy (dwell time at cued toy / dwell time at all non-moving toys) in Expected and Unexpected conditions.

Results: In Expected condition %SJA was above chance-level at all ages (ps < 0.001) and increased from 18 to 42m (p < 0.047) in TD and DD groups. In the ASD group, %SJA was above chance-level at 30 and 42m (p < 0.001), but not at 18m. Although %SJA increased from 18 to 42m (p < 0.017) in ASD, it was lower than in both control groups at both timepoints (p < 0.040). %SJA of TDs in Unexpected was above chance-level only at 42m (p = 0.015) and it increased from 18 to 42m (p = 0.030). Although %SJA increased from 18 to 30m in the ASD group (p = 0.049), both ASD and DD groups performed at chance-level at all ages (ps > 0.101) (Figure 1).

Conclusions: Contrary to expectations, children with ASD at 36 and 42 months evidenced robust SJA in a distractor-free setting (Expected-condition), even though effects were muted compared to DD and TD controls. The condition in which referential gaze was directed opposite the location of a perceptually salient stimulus (Unexpected-condition) proved difficult for all; only TDs showed evidence of SJA at 42 months, while DD and ASD children did not exhibit SJA at any time point. Children with neurodevelopmental disorders may share difficulties in inhibiting attention to a salient distractor, preventing input from more relevant sources. Further research is warranted to understand the disruption of SJA in ASD and DD under informationally noisy yet ecologically-valid conditions.

432.155 (Poster) Testing Executive Functioning As a Predictor of Restricted and Repetitive Behaviors and Interests in Young Children with Autism Spectrum Disorder
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Background: Previous studies suggest that executive function (EF) is related to restricted and repetitive behaviors and interests (RRBIs) in older youth diagnosed with autism spectrum disorder (ASD). Pellicano (2013) found that early EF predicts later RRBI expression. However, few published studies examine EF and RRBIs in autistic toddlers and preschoolers.

Objectives: To examine whether EF subdomains (inhibition, set-shifting, working memory, and delay) predict higher-order and sensorimotor RRBI presentation in two- and four-year-old autistic children.

Methods: Participants were 140 (33 females) two- and four-year-olds diagnosed with autism spectrum disorder using the Autism Diagnostic Observation Schedule–Second Edition and the Autism Diagnostic Interview–Revised (ADI-R). Individual RRB items in the ADI-R were summed to calculate higher-order and sensorimotor RRBI composites. The Mullen Scales of Early Learning measured developmental levels in the two-year-olds (n=78; M=66.9 (16.7)) and four-year-olds (n=62; M=72.5 (22.3)). Children also completed several EF tasks to create composites for inhibition, set-shifting, working memory, and delay.

Results: We first examined whether RRBIs and EF differed between two- and four-year-olds. Higher-order RRBIs were more prevalent in the older group, t(140) = -2.64, p = .009, but sensorimotor RRBIs did not differ by age, t(140) = -0.35, p = .73. EF composites also differed by age for delay, t(140) = -5.52, p < .001, working memory, t(76) = 3.47, p = .001, and inhibition, t(98) = 2.85, p = .005, but not set-shifting, t(100) = -1.41, p = .163. Due to age differences in RRBI expression, we examined correlations in the two age groups separately. Within the two-year cohort, higher-order RRBI related to age, r(78) = -0.46, p < .001, and Mullen composite, r(76) = .28, p = .01, but not EF, ps > .18. Within the four-year cohort, higher-order RRBI related to Mullen scores, r(60) = .40, p = .001, inhibition, r(53) = .27, p = .05, and delay, r(60) = .27, p = .03, but not age, set-shifting, or working memory, ps > .14. Interestingly, cognitive ability was positively associated with higher-order RRBI expression, r(53) = .40, p = .001. In a regression model with the four-year cohort, EF scores did not significantly predict higher-order RRBIs when controlling for overall developmental level. Sensorimotor RRBI were not related to age, Mullen scores, or EF in the two-year (ps > .19) or four-year (ps > .11) cohorts.

Conclusions: Our preliminary findings suggest that executive function abilities do not relate to higher-order and sensorimotor RRBI in young autistic children beyond age and developmental level, which differs from previous studies with school-age autistic children but is consistent with the emergence of RRBI during toddlerhood. Other factors, such as anxiety and emotion regulation, may modulate RRBI presentation in early stages of development. Data collection is ongoing, and we plan to examine whether parent reported anxiety scores relate to EF or RRBI in this age range.

432.156 (Poster) The Development of Neural Tracking in Infants with and without an Elevated Likelihood for Autism: Links with Language Development
Background: The ability to acquire language relies on a sophisticated processing system, developing across the first years of life. The neural mechanisms underlying language processing are not yet fully understood. However, one candidate mechanism is the neural tracking of the amplitude envelope of speech – referred to as ‘neural tracking’. More specifically, the speech envelope contains acoustic information across multiple temporal-scales – for example, at the phonological (~30-50Hz), syllabic (~4-8Hz) and lexical/phrasal rate (<2 Hz). It has been shown that neurophysiological signals follow these amplitude fluctuations, which is thought to support the parsing of the speech signal into linguistically relevant units. Furthermore, there is some evidence that neural tracking may be reduced in autistic adults (Jochaut et al., 2015). Emerging evidence from one study including infants with an elevated likelihood for autism also suggests that early tracking may be linked to subsequent language development (Menn et al., 2022). However, given the paucity of studies in infant samples, our current understanding of the development of neural tracking and its role in language development remains relatively unexplored.

Objectives: The current study aimed to investigate: 1) differences in neural tracking across infants with and without an elevated likelihood for autism (i.e., younger siblings of autistic children and infants born very preterm), at 10- and 14-months; and 2) whether any differences in neural tracking relate to language development and joint-attention.

Methods: Electroencephalography signals were recorded at 10- and 14-months as infants listened to nursery rhymes of native Dutch speakers. To assess neural tracking, a backwards multivariate temporal response function model was employed (Cross et al., 2016). This approach is based on a ridge regression fit between the amplitude envelope of the speech signal and EEG response; providing a measure of the extent to which the EEG signal decodes the speech stimulus. The predictive accuracy of the model was assessed by computing the Pearson correlation coefficient between the actual speech stimulus, and that predicted by the model.

Results: Preliminary results in infants with an elevated likelihood for autism (n = 28) indicate that the highest predictive accuracy was observed at delta (\(M = 0.026 \ (SD = 0.027)\)) and theta (\(M = 0.017 \ (SD = 0.021)\)) frequencies, whilst lower \(r\) values were observed at alpha frequencies (\(M = 0.003 \ (SD = 0.008)\)). A series of Wilcoxon rank tests revealed significantly higher reconstruction accuracy at theta (\(z = 2.42, p = 0.16\)) and delta (\(z = 2.83, p = 0.005\)) frequencies, compared to alpha. No significant difference was found between delta and theta (\(z = 1.34, p = 0.181\)). In addition, frequencies at the theta band were associated with indices of language development at 14-months (moderate effect size).

Conclusions: Higher predictive accuracy was observed at delta and theta frequencies, compared to alpha. This is consistent with the literature suggesting greater neural tracking at delta/theta rate frequencies. The data presented at INSAR-2023 will be extended – comprising the full sample (\(N = 87\)) and group differences across infants with and without an elevated likelihood for autism.

432.157 (Poster) The Developmental Six-Component Model of Reward Processing: A Reconceptualization and Literature Review of Typical and Autistic Development

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Background: Differences in reward processing have been associated with numerous conditions, including autism and ADHD. Many attempts to understand reward processing characterize differences in neurodivergent populations in adolescence and adulthood; however, divergence may begin much earlier. In fact, the typical developmental progression of reward processing in infancy and early childhood is poorly understood. We reconceptualize classic infant developmental constructs such as preferential looking into a Six-Component Developmental Model of Reward Processing: an infant- and young child-focused framework to guide research and assessment of reward processing across development. The primary application of this transdiagnostic work is to autism, where the motivation hypothesis suggests differences between autistic and nonautistic individuals in what feels motivating and rewarding. These differences may manifest as hyperfocus, strong passions, and ability to develop highly specialized skills. Reward processing might lie at the core of these autistic features, but little is known about how or when reward processing develops. Understanding its development could allow us to support the development of beneficial related traits in both autistic and nonautistic individuals.

Objectives: To review current findings on components of reward processing in autistic and nonautistic development, then provide a conceptual framework and experimental paradigms to improve assessment of reward processing developmentally.

Methods: The extant developmental literature including recent textbooks, systematic reviews, and meta-analyses was reviewed to build a conceptual framework and estimate a timeline of each component’s emergence in the social and nonsocial domains. We describe and recommend new and existing experimental paradigms to assess each developmental component of reward processing longitudinally from infancy, filling gaps.
Results: Six components of reward processing were identified — association, discrimination, preference/valuation, effort, anticipation, and response (Figure). Selected evidence suggests emergence between birth and six months (Table). Application of this model to autism led to a reinterpretation of existing disparate results around the motivation hypothesis. For example, we found reported differences in discrimination abilities (slower habituation, reduced neural suppression) as early as 8-10 months in infants later diagnosed with autism, consistent with an ability to maintain interest in a stimulus long after nonautistic individuals may become ‘bored’. However, at odds with this idea are findings from other studies reporting a stronger novelty preference among infants later diagnosed with autism; this processing bias could manifest as heightened distractibility. On the other hand, we found almost no autism developmental research on anticipation nor contingency learning, two essential components of reward processing. Novel paradigms could fill this gap, such as adapting the conjugate mobile paradigm to incorporate the progressive ratio task (KickMORE).

Conclusions: The proposed framework reconceptualizes the extant literature and could be used to guide future research. Longitudinal studies of the suggested experimental paradigms could elucidate the developmental trajectory of the six components and timing of potential sensitive period(s) for each component. Given previous findings that only some aspects of reward processing differ between autistic and nonautistic individuals, it is important to identify which aspects lead to beneficial traits, and support development of such traits.
to infant siblings of children with ASD who are younger than 6 months can add to our understanding of the emergence of ASD by quantifying very early embodied social attention in naturalistic settings. Yet the feasibility of using HMET in younger infants or infants at elevated genetic likelihood for ASD has yet to be established. At this age, infant acceptability can be impacted by sensory challenges that decrease tolerance for wearing HMET headgear. Data quality can be negatively impacted by motoric actions, including reaching and rolling, that interfere with camera stability. The feasibility of mobile eye tracking in young infants, including acceptability and data quality, is important to document and compare across groups of interest.

Objectives:

This study aims to determine the feasibility of using HMET to study infant attention in 4-month-olds and compare feasibility between infants at elevated (EL) and low (LL) genetic likelihood for ASD.

Methods:

Infants and their caregivers (LL=10, EL=16) were enrolled in a longitudinal study of social attention prior to 4 months of age. At 4 months, participants completed four interactions that cut across two positions (supine and reclined) and two interaction contexts (infant-caregiver and infant-caregiver-toys) while wearing a HMET unit (see Figure 1). Two aspects of feasibility across groups were analyzed: infant acceptability of the procedure and eye image data quality (see Table 1). To examine motor ability as a possible contributor to data quality, infant reaching and rolling ability (in supine) were also assessed.

Results:

In regard to infant acceptability, infants completed between 2-3 of the 4 interactions during each study visit (M=2.77, SD=1.25); 96.15% (n=25) completed ≥1 full interaction and 46.15% (n=12) completed all 4 interactions. Results revealed no differences in acceptability based on group status (EL vs. LL: t(20.95)=1.21, p=.24), infant position (t(101.5)=.84, p=.40), or interaction contexts (t(101.88)=-.42, p=.67).

Similarly, there were no differences in data quality (%time with “good” eye image) based on group status (t(80.61)=.86, p=.39), position of the interaction (t(99.86)=.42, p=.68), or interaction contexts(t(88.92)=.50, p=.62).

In terms of motor abilities, 50% of infants were reaching. Reaching ability did not impact infant acceptability (t(22.86)=-.92, p=.37), but had a marginally significant effect on data quality (t(21.78)=1.80, p=.08). Similarly, 50% of infants were rolling from their back to their side. Rolling ability did not affect infant acceptability or data quality (p’s>.05).

Conclusions:

This study indicates that EL and LL infants show similar acceptability in completing an HMET session. Additionally, motoric ability had no effect on infant acceptability and a marginal effect on data quality. These findings demonstrate preliminary feasibility of collecting HMET data with 4-month-old infants and that data quality is comparable across infants with varying motor abilities and infants at elevated and low likelihood for ASD. HMET is a promising tool for studying very early social attention in EL infants.

432.160 (Poster) The Overlap and Distinction of Childhood Temperament Profiles for Autistic and ADHD Youth

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Background: Evolving criteria now permit co-occurring diagnoses of Autism and Attention-Deficit/Hyperactivity Disorder (ADHD), with 40-60% of autistic youth also meeting diagnostic criteria for ADHD (Minohar et al., 2018; Stevens et al., 2016). The combined autistic (AT)+ADHD neurotype is associated with more substantial support needs (Zablotski et al., 2020) and delayed autism diagnosis (Kentrou et al., 2018), highlighting the need for better understanding of the overlap and distinction of autism and ADHD. Childhood temperament may be useful to characterize heterogeneity within neurodivergent youth (Karalunas et al., 2019) and enhance understanding of autism and ADHD beyond diagnostic labels to inform tailored supports.

Objectives: To identify profiles of childhood temperament across a neurodiverse sample and examine the distribution of autistic and ADHD youth within these profiles.

Methods: Parent report of youth temperament was collected via the Temperament in Middle Childhood Questionnaire (TMCQ; Simonds et al., 2007; Simonds & Rothbart, 2004) within two, community-recruited samples (n=1698, Mage=9.85, SDage=1.92) enriched for autism.
Background: During the first 2 years of life, social-communicative abilities develop rapidly. These developmental changes in behaviour are accompanied by changes in the brain, which reflect the emergence of the so-called “social brain”. Oscillatory activity of the ongoing electroencephalogram (EEG) is one way to investigate how these new networks develop in infants. Spectral power in various frequency bands extracted by spontaneous EEG has been associated to different functional correlates. In particular, theta (4-6 Hz) has been associated with the processing of social stimuli and social behaviour in infants. Work in this area is important not only for testing theories of typical social development, but also for identifying new ways to study the mechanisms underlying the early emergence of social and communication difficulties, such as the ones associated with autism. Research on early biomarkers has reported atypical brain development in children with autism and infants at elevated likelihood for autism (namely siblings and preterms). Among these findings, EEG spectral power (both in resting state and in response to specific stimuli) has also been associated with autism and likelihood of autism.

Objectives: In the present study we investigate whether there are differences in the theta spectral power in response to social vs non-social dynamic stimuli in infants with elevated likelihood (EL) and typical likelihood (TL) for autism.

Methods: 32-channel spontaneous EEG signal was recorded with an ActiChamp amplifier and Brain Vision Recorder (Brain products, version 1.21.0402) from 5 EL (3 females) and 20 TL (10 females) infants between 10 and 14 months old. The children were presented with Social (4 nursery rhymes with gestures sang by two women) or Non-Social (5 vignettes of child-appropriate dynamic toys) videos of approximately 1-min duration. The videos were repeated 3 times during the session and the order of presentation was counterbalanced. The EEG signal was cut into 1-second segments and manually edited for artifacts. In order to obtain frontal theta (4-6 Hz) power indices, absolute power was extracted and averaged among frontal electrodes (F3 and F4).

Results: The current results are preliminary, as data collection is ongoing. Frontal theta power was significantly larger for the Social compared to the Non-Social condition in the TL children (\( p = 0.017 \)). This effect of condition seems to not be present in the EL group (\( p = 0.812 \)). Because of the currently limited sample and the unbalanced group sizes, we did not yet compare the two groups. Complete results of the full sample will be presented at the conference.

Conclusions: These preliminary results could: a) support findings from previous studies suggesting that theta power is sensitive to social stimuli in TL infants and might reflect activity of the emerging “social brain”; b) EL children might not show this pattern. However, final conclusions cannot be drawn until the full sample has been collected. Theoretical and clinical implications will be discussed.
Background: Studies have shown that spontaneous motor activity of infants later diagnosed with Autism Spectrum Disorder (ASD) appears to be impaired already in the first months of life. The research indicates that the motor patterns within this population are less developed and could potentially serve as early markers of ASD.

Objectives: In the present study, we aim to investigate the use of DeepLabCut (DLC), an open-source toolbox contained within a Python package, for recognizing the early motor development patterns of individuals later diagnosed with ASD or another neurodevelopmental disorder (NDD). Another goal of this work is to train a machine learning algorithm that could distinguish between individuals with and without an NDD diagnosis, based on the motor features considered to be meaningful for identification of pathological motion patterns, i.e., mean velocity and acceleration, as well as their cross-correlations, skewness of velocity distribution, periodicity in trajectories and velocities, area differing from moving average, and area out of standard deviation of moving average.

Methods: The longitudinal data was collected by the Italian Network for early detection of Autism Spectrum Disorder (NIDA) and consisted of infant videos recorded at 10 days, 6, 12, 18, and 24 weeks of life. We included 174 videos of individuals with elevated likelihood of ASD (86 females, 88 males) who have an older sibling with a clinical diagnosis of ASD. To track the trajectories of infants’ hands and feet in space, we used the DLC markerless pose estimation method. To check the reliability of DLC tracking performance the detected positions were compared with the results obtained by MOVIDEA software using the Percentage of Correct Key-points (PCKh) accuracy metric.

Results: The model trained within DLC can successfully track infants’ hands and feet movement with a mean accuracy of 3.84 pixels. We obtained satisfactory PCKh values of 96.6% (left foot), 96.2% (right foot), 80.9% (left hand), and 82.8% (right hand). Nevertheless, the infants’ back of the hand was often not visible. Therefore, the motor features were computed using only the feet trajectories.

Conclusions: DLC is a useful method that can be applied to track infant movement. It allows further computation and analysis of motor patterns that could be useful in early diagnosis of ASD. In the nearest future, we intend to feed the extracted features to a machine learning classifier and verify whether they could predict an NDD diagnosis.

432.163 (Poster) Visual Attention to the Face and Mouth during Infant-Directed Song and Speech across Development in Autism and Typical Development

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Background: Infant-directed (ID) song and speech both promote children’s attention with ID song being particularly effective at sustaining infants’ attention in typically developing (TD) infants and those with ASD (Macari et al., 2020). However, specific patterns of social visual engagement across development and in relation to song characteristics are unknown. Probing children’s social visual engagement during ID song and speech may inform processes by which such activities scaffold social and communication development.

Objectives: Examine the trajectories of overall visual attention, attention to the face, and attention to the mouth for ASD and TD infants/toddlers across the first two years of life during infant-directed (ID) song with and without gestures, and ID speech.

Methods: 143 TD and 65 ASD male infants viewed audiovisual clips of naturalistic ID speech without gestures, ID song without gestures, and ID song with gestures, while eye-tracking data was collected longitudinally at 6, 9, 12, 18, and 24 months.

We ran 3 mixed-effects models with random intercepts and random slopes for age per subject predicting either total fixations, fixations to face, or fixations to mouth with a linear and a quadratic component of age, clip category, diagnosis, and all interactions.

Results: TD infants fixated significantly more than ASD infants overall (B=0.05, p<.001). However, both TD and ASD infants exhibited higher overall fixation rates for song over speech (B=0.03, p<.001), and for song with gesture over song without gesture (B=0.04, p<.001). Fixations increased with age overall during the first year across diagnostic groups, and continued to increase for speech during the second year for TD but not ASD infants (B=3.2, p<.05, Figure 1A).

Attention to the face increased over development across categories for TD but not ASD (B=2.6, p<.01). This group trajectory difference was most apparent for song with gestures (B=−4.5, p<.01), with attention increasing for TD, while decreasing for ASD. Fixations to the face, were also lower overall across diagnostic groups in song with gestures than in the other two contexts (B=−1.1, p<.001, Figure 1B).

Both TD and ASD infants’ overall attention to the mouth increased with age (B=2.9, p<.001), as in previous studies. Attention to the mouth was significantly higher overall during song without gestures than during song with gestures (B=−0.08, p<.001) or during speech (B=−0.12, p<.001) across diagnostic groups (Figure 1C).
Conclusions: Infants with and without ASD engage differently with ID song and ID speech across development. ID song potentiates overall visual engagement over a longer developmental time window in ASD. Song also promotes mouth-looking for both TD and ASD, of interest given mouth-looking’s association with expressive language skills (Habayeb et al., 2021). However, the group differences in overall attention and attention to the face indicate the mechanisms and adaptive value of attention to the mouth might vary across diagnostic groups. Future analyses will examine children’s individual differences (e.g., language skills, musical preferences), and stimuli level characteristics (e.g., gestures, tempo) to inform mechanisms by which song impacts attentional allocation and potential clinical implications in early intervention for ASD.

Background: Early detection of autism spectrum disorder (ASD) characteristics by parents or primary caregivers during infancy can lead to early diagnosis and interventions. While various ASD signs can appear within 6 to 18 months, the timing in which parents raise concerns about their children's ASD characteristics varies (Tanner & Dunavi, 2021). Understanding the factors that influence parents' perception of ASD characteristics in their children can help with early detection.

Objectives: To identify factors that influence the early detection of children's ASD signs, we explored various characteristics of the child and their caregivers.

Methods: Based on the data collected from Korean families, we explored the parents' age during pregnancy, educational background, occupational group, and family economic status as parental variables. The severity of ASD symptoms measured by the ADOS-2 comparison score and the timing of the child's first word was also included and evaluated using Pearson's correlation. Parental awareness of initial concerns was identified using the ADI-R question item and divided into five categories. Comparison between parents' perceived timing of risk signs and trained administrators were compared using t-tests.

Results: Data from 1608 individuals with ASD were analyzed (M=76.65, SD=51.21). The average age that parents perceived difficulties was 25.2 months (range=1~160month, SD=15.63), while experts perceived ASD-related risk signs around 20.2 months (range=1~84month, SD=9.47). Language development and communication (39.8%; language delay, etc.) were mostly reported, followed by social interaction (37.7%; eye contact, response to name, play alone, etc.), other developmental characteristics (10.6%; late walking, sleep problems, etc.), repetitive restricted behaviors (8.8%; repeated spinning, etc.), and cognitive difficulties (1.8%). 1.3% reported no concerns. We found that delays in first-word usage were correlated with earlier detection (r=-.096, p<.01). The age at which the mother was pregnant and the mother's occupational group showed a small but significant correlation with when concerns were raised (r=-.061, -148, p<.05, <.01). These variables were also related to the difference between the time of when the parent recognized the difficulties and when the expert evaluated them (r=-.067, -.082, p<.05). On the other hand, the severity of the current ASD symptoms did not correlate with the timing of detection (r=-.29).

Conclusions: The timing of parents' recognition of their children's ASD signs was not much different from that of experts, but considering the emphasis on early detection and early intervention before 24 months, it will be necessary to help them perceive their children's difficulties earlier. In the case of noticeable delays, such as the delay of the first word, led parents to recognize ASD signs early, and the mother's variables such as the pregnancy age and occupational group influenced early detection. While communication and social domains were prominent as factors perceived by parents, core symptoms on DSM-5 such as RRB were not well recognized. Therefore, explicit parental education on typical development in infancy and atypical development will be very important.

Background:

A meta-analysis of face processing studies reported that the latency of the N170 ERP component was larger in children and adults with Autism Spectrum Condition (ASC) compared to non-autistic children and adults (Kang et al. 2018). It was suggested that the N170 latency could serve as a possible stratification marker of ASD that is robust to age, sex, and cognitive functioning. However, the meta-analysis involved only three children younger than 5 years.

432.164 (Poster) When, Why, and What Causes Parents to Raise Concerns about ASD?

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Conclusions: Infants with and without ASD engage differently with ID song and ID speech across development. ID song potentiates overall visual engagement over a longer developmental time window in ASD. Song also promotes mouth-looking for both TD and ASD, of interest given mouth-looking’s association with expressive language skills (Habayeb et al., 2021). However, the group differences in overall attention and attention to the face indicate the mechanisms and adaptive value of attention to the mouth might vary across diagnostic groups. Future analyses will examine children’s individual differences (e.g., language skills, musical preferences), and stimuli level characteristics (e.g., gestures, tempo) to inform mechanisms by which song impacts attentional allocation and potential clinical implications in early intervention for ASD.

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432.165 (Poster) Are ERP Responses to Faces Atypical in Young Children at Elevated Likelihood for Autism Spectrum Disorder? a Meta-Analysis

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Conclusions: Infants with and without ASD engage differently with ID song and ID speech across development. ID song potentiates overall visual engagement over a longer developmental time window in ASD. Song also promotes mouth-looking for both TD and ASD, of interest given mouth-looking’s association with expressive language skills (Habayeb et al., 2021). However, the group differences in overall attention and attention to the face indicate the mechanisms and adaptive value of attention to the mouth might vary across diagnostic groups. Future analyses will examine children’s individual differences (e.g., language skills, musical preferences), and stimuli level characteristics (e.g., gestures, tempo) to inform mechanisms by which song impacts attentional allocation and potential clinical implications in early intervention for ASD.
Objectives:

To establish whether the N290/P400 complex – the developmental precursor of the N170 at later age – also indexes atypical neural mechanisms of face processing in very early childhood. Our first aim was to meta-analyze the literature investigating differences in N290 and P400 response to faces in infants and young children with an elevated likelihood (EL) of autism in comparison to low likelihood children (LL). Our second aim was to investigate whether the EL and LL children differ already in low-level visual processing (P1 component) to rule out any potential carry over effects in our later components of interest.

Methods:

The meta-analysis was conducted in line with the PRISMA guidelines and prospectively registered with PROSPERO (registration no. CRD42022302537). Across 5 databases 1139 records were identified, of which 20 studies met the inclusion criteria. Overall, data were collected from 280 EL children and 357 LL children (8 to 48 months old). Random effects meta-analyses were performed using the ‘meta’ package in R.

Results:

P400 amplitude (but not the latency) was significantly larger for EL compared to LL children ($g=-0.2$, $k=18$, $p<0.0001$). There was no evidence of publication bias and heterogeneity between effect sizes for the P400 component. No group differences were found for the P100 and N290 amplitude and latency. The only meta-analytic model that was powered enough to reach a precision of above the normative 80% threshold was the P400 amplitude model. The rest of models were all underpowered (average precision power of 23%).

Conclusions:

We found no differences in the amplitude and latency of P100 and N290 but a significantly smaller P400 amplitude for EL compared to LL children. This was in contrast to our hypothesis given that the N290 is thought to be a precursor of the adult N170 and one of the most frequently studied face-specific ERP components. The P400 has been associated with face processing as well as allocation of attention and may play a crucial role in novelty or saliency processing. In previous studies, group differences in P400 amplitude have only been reported when task demands are high, perhaps reflecting an impact of attention on the component, as attention is often impaired in ASD. This also might explain the lack of significant findings for the N290 component as attention may play a smaller role in N290 responses as it reflects a more automatic process of face detection.

432.166 (Poster) Examining the Agreement between Caregiver-Reported and Direct Assessment of Child Imitation

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Background: Caregivers are important informants of child behavior beyond what is observed in the clinical setting; however, extant research is mixed on the degree of alignment of caregiver reports with direct observations. Low agreement between parent report and ratings of home-video observations of social-communication behaviors was reported in one study of autism symptom onset (Ozonoff et al., 2011). In contrast, agreement between caregiver-report and direct assessment of child language and fine motor abilities has been found (Miller et al., 2017). Early imitation skills are often reported on and directly assessed during developmental evaluations in early childhood because early imitation skills are related to later gains in language and social interaction skills (Pittet et al., 2022; Yoder et al., 2009). Yet, little is known about the agreement between caregiver reports and ratings of direct observations of child imitation skills, despite the measurement of this competency in diagnostic and intervention decision-making.

Objectives: We evaluated agreement between caregiver-reported and direct assessment ratings of child imitation in toddlers with social communication delays indicative of possible autism spectrum disorder.

Methods: Sixty-three caregivers (56 mothers, 6 fathers, 1 grandmother) and children (40 boys, age $M=26.30$ months) participated in a research study examining the effectiveness of caregiver-implemented Reciprocal Imitation Teaching, a Naturalistic Developmental Behavioral Intervention, delivered through the Part C Early Intervention system. Caregiver-reported imitation was measured using items from the Parent Interview for Autism-Clinical Version, Vineland Adaptive Behavior Scales-Third Edition, Brief Infant-Toddler Social and Emotional Assessment, and a new questionnaire called ‘My Toddler’s Social Communication’. The caregiver-reported measures were standardized and combined to create a composite imitation scale (Total Imitation Scale) that was used for analyses. Direct assessments of children’s prompted and spontaneous imitation were collected through an experimental caregiver-administered in-home assessment, the Communication Play Protocol (adapted from Adamson & Bakeman, 2016). First, we examined the internal consistency and subscales of the Total Imitation Scale. Next, we ran correlations between the Total Imitation Scale and the direct assessments of child imitation. We
hypothesized that the Total Imitation Scale would demonstrate adequate internal reliability and would be significantly related to direct child imitation measures.

Results: The Total Imitation Scale had strong internal reliability (Cronbach’s α = .87) and was significantly correlated with both direct measures of prompted child imitation ($r = .36, p = .003$) and spontaneous child imitation ($r = .69, p < .001$). These direct measures of prompted imitation and spontaneous imitation were also significantly related ($r = .35, p = .005$).

Conclusions: Caregiver reports of child imitation were significantly, positively correlated with direct assessments. This agreement between caregiver-reported and direct assessments of child imitation skills suggests that caregivers can be reliable informants during the evaluation process when assessing imitation. Interestingly, the correlation between caregiver-reported imitation and direct assessments was stronger for measures of spontaneous imitation. Future research should examine the validity and reliability of caregiver report for spontaneous versus prompted imitation, and whether there is change in agreement over time.

Epidemiology

PANEL DISCUSSION — EPIDEMIOLOGY

203 - I Am Not an "Other": Cross-Cultural Representation and Health of Indigenous, Immigrant, or Puerto Rican Autistic Individuals in Health Services Data

Panel Chair: Teal Benevides, Institute of Public and Preventive Health, Augusta University, Augusta, GA

Autism is represented in the literature by primarily young white males, creating a cycle of marginalizing work that fails to address needs of people outside of this demographic. Although strides in increasing diversity in autism research samples have occurred in recent years, limited work has addressed what is known about health of people generally left out of research studies: indigenous individuals, immigrants, non-English speaking individuals, and individuals from Puerto Rico. In demographic descriptions for race, ethnicity, and geographic location, individuals from groups with small samples are classified as “Other”. This panel’s sessions leverage existing data to capture health outcomes of groups who are infrequently described due to small samples or inadequate recruitment. We point to ways in which research can be modified to be more culturally relevant for autistic people and families. Panel topics are exploratory, and although panelists focus on data from the United States, we wish to begin a conversation with attendees about what we can learn when we disaggregate large data to understand needs and gaps as a path to conversations with community leaders and partners. We will emphasize the importance of this knowledge for international discussion because immigration and challenges for indigenous individuals exist worldwide.

203.001 (Panel Discussion) Health and Health Care Among Indigenous Pacific Islander, Alaska Native, and Native American Autistic Adults Enrolled in U.S. Medicare and/or Medicaid

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Background: Limited scientific knowledge in the field of autism has been generated with samples representing culturally and racially diverse individuals, including indigenous individuals from Pacific Islander, Alaska Native, and Native American communities. Indigenous autistic groups may be at risk for adverse health outcomes and receipt of inadequate health care.

Objectives: The purposes of this study were to 1) describe the demographic characteristics of indigenous autistic adults enrolled in U.S. Medicare and/or Medicaid, which frequently cover medical care for autistic individuals, and 2) quantify chronic health conditions and medical utilization compared to non-indigenous adults on the spectrum.

Methods: We used Medicare-Medicaid Linked Enrollees Analytic Data Source (MMLEADS-2012) data. MMLEADS are aggregated annual claims of all individuals in all U.S. states enrolled in Medicaid on the basis of disability, dually-eligible for both Medicaid and Medicare, and those enrolled in Medicare. MMLEADS-2016 exists but does not contain chronic health condition variables, making 2012 data the best source for this research. We included adults identified as American Indian or Alaska Native (AIAN; n=1,455) or Pacific Islander (PI; n=1,179). Chi-square and multivariate logistic regressions adjusting for age, sex, intellectual disability, geographical location, and rurality compared indigenous individuals with non-indigenous adults on the spectrum (n=185,954) on chronic conditions, annual emergency department (ED) use, and prescription drug use.

Results: See Table 1. Frequency of dual-eligibility was significantly lower among PI (29%) compared to AIAN (46.9%) or non-indigenous (44.2%) adults. AIAN adults were significantly more likely to have a chronic health condition compared to PI adults and non-indigenous individuals. Across age groups, AIAN individuals were significantly more likely to have a chronic condition compared to non-indigenous individuals at younger ages: 18-25-year-olds (OR=1.27, 95%CI: 1.07-1.50), 26-35-year-olds (OR=1.32, 1.08-1.62). PI
individuals were significantly less likely than non-indigenous individuals to have a chronic health condition at younger ages (18-25y, 26-35y). The odds of having a chronic health condition were 4 times higher among PI aged 56-65 years compared to same-aged non-indigenous individuals (OR=4.31, 1.00-18.63). AI/AN individuals had double the odds of having a chronic condition at ages 56-65 years compared to non-indigenous individuals (OR=2.21, 1.03-4.72). Rates of any annual ED use were significantly lower among PI (10.8%) compared to AI/AN (30.3%) and non-indigenous autistic adults (27.3%). PI autistic adults had significantly fewer prescription drug fills annually (median prescriptions=22) compared to AI/AN (median=32) and non-indigenous adults (median=38).

Conclusions: This is one of the first studies to identify healthcare conditions and service use among a large sample of indigenous autistic adults in the U.S. Unfortunately, most analyses of claims data collapse indigenous individuals together into a single group, or exclude them altogether, hindering understanding of individuals and care needs. Our findings suggest that types of coverage differ (Medicare, Medicaid, both), as well as rates of chronic conditions, use of the emergency department, and prescription drugs. Next steps should include mixed-method approaches to engage these communities about priorities and desired approaches for health outcomes to ensure research aligns with preferences for care and care outcomes.

203.002 (Panel Discussion) Autistic and Immigrant: An Analysis of Health of Autistic Immigrant Adults in the U.S. Medicaid Program
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Background:

About 22.1 million immigrants, including lawfully present and undocumented, lived in the United States in 2020. Nonelderly noncitizens with disabilities were less likely to be insured than citizens, which poses challenges to accessing health care support. Eligibility restrictions for Medicaid and barriers to enrollment among eligible individuals, contribute to the higher uninsured rate among noncitizens. Previous studies have demonstrated that the states that choose to expand Medicaid coverage showed an increase in Medicaid enrollment among immigrant children. However, few policy efforts target immigrant adults. Medicaid is the largest insurer in the U.S. for autism services and may be the only available insurer for many disabled adults. To meet the needs of autistic immigrant adults, it is essential to understand the disparities in physical and mental health conditions by immigrant status among the Medicaid population in the U.S.

Objectives:

The purpose is twofold: (1) identify the prevalence of various health conditions, both mental and physical conditions, in the population of autistic immigrant adults enrolled in Medicaid in 2016; (2) compare the prevalence of co-occurring conditions in immigrants to the U.S. citizens among autistic adults.

Methods:

We utilized administrative claims from the Centers for Medicare & Medicaid Services (CMS) Transformed Medicaid Statistical Information System Analytic Files (TAF) data file, containing data from all 50 states and Washington DC. Our population of autistic adults (18-64 years old) was identified if they had at least two outpatient or one inpatient claim with an ICD-10 diagnosis (F84. x) who were Medicaid beneficiaries in 2016. The immigrant status was coded as (1) qualified non-citizen (QNC; N=2,952) and (2) U.S. citizen (N=240,037).

Results:

The sample characteristics and prevalence of co-occurring conditions are presented in Table 1. Differences in age, sex, and urbanicity between groups were modest. The QNC group had a higher percentage of Black, Hispanic/Latino, and Asian/Hawaiian/Pacific Islander than the citizen group. The QNCs were also more likely to have intellectual disabilities (p<0.001). Among the five co-occurring mental health conditions, the most diagnosed condition among QNCs was anxiety, followed by ADHD. The QNC group had a higher percentage of having Alzheimer’s disease than citizens (p<0.001). The physical health conditions with the highest prevalence among QNCs were epilepsy, hypertension, and hyperlipidemia. The QNCs were more likely to have epilepsy (p=0.003), diabetes (p<0.001), hyperlipidemia (p=0.003), and hypertension (p<0.001) than citizens.

Conclusions:

Our study is the first investigation of the health of autistic immigrant adults. Our analysis showed immigration status differences in some of the most common physical health conditions. These disparities are likely driven by environmental, behavioral, and psychosocial factors, which warrants future research efforts. Autistic immigrant adults may be at a double disadvantage, at higher risk of premature mortality and chronic health conditions associated with autism, yet also facing discrimination and lower access to services as members of immigrant groups. Understanding the increased risk for specific co-occurring conditions in immigrant groups can support the formulation of joint
access to services when there are multiple service needs to ensure health equity.


Background:

Calls to action from the autism community have underscored the need to center the experience of autistic individuals from multiple viewpoints and residence. Limited research has elevated the experiences of autistic individuals in US territories, including the oldest and most populous, Puerto Rico (PR). PR residents are US citizens who have nonvoting representatives in US governing bodies. Most of the PR population reports being Hispanic or Latino (98.9%). PR operates an island-wide public health insurance (Medicaid) program, the Government Health Plan or Vital, that was expanded under the Affordable Care Act. Eligibility is based on age, income, or disability. The CDC ADDM Network in the US does not include Puerto Rico, but it has identified that the number of Hispanic children with an autism diagnosis is lower than other groups.

The limited research base that has sought to understand the experiences of autistic individuals and their families or caregivers in PR has been focused on epidemiologically-focused research, such as prenatal exposures that utilized population-based sibling cohort studies. Efforts to identify mental health diagnoses and service usage among parents and relatives found higher rates of several MH diagnoses. Recent research in Puerto Rico recommended screening procedures in Latino populations to link to evaluation referrals.

Objectives: This study seeks to identify the characteristics of Medicaid-enrolled autistic individuals in Puerto Rico.

Methods: National (US) Medicaid claims for 2016 for all enrolled autistic individuals of all ages were utilized. Autism and intellectual disability were identified through validated algorithm from the Chronic Condition Warehouse (CCW) which aligns with the strategy deployed in the majority of autism research.

Results: Medicaid-enrolled autistic individuals in PR included mutually exclusive groups of individuals with co-occurring intellectual disability (ID, n=452) and without co-occurring intellectual disability (n=3,921). Comparison groups of individuals with intellectual disability only (n=5,479) and a random sample of other Medicaid enrollees (n=6,554) in PR were also compiled. Both autism groups were younger than the ID and other Medicaid enrollee groups. Almost half (44%) of the autism-only group was under the age of 10 and 36% were between ages 11 and 18. Fewer than one in five individuals in the ASD-only group were over age 18. The autism+ID group was older on average, with 12% under the age of 10, and 32% were ages 11 to 18. More than half (56%) of the ASD/ID group was over the age of 18. Ages were evenly distributed across the ID-only and random Medicaid sample population. With recently acquired data through 2019, groups will be updated across age and demographic/clinical characteristics.

Conclusions: Our initial analyses identified a robust group of autistic individuals enrolled in Medicaid in PR. Most individuals were youth or young adults, in contrast to their peers with ID. Population-level data, including Medicaid, presents a unique opportunity for next steps to identify their healthcare access and service use, as well as demographic and clinical characteristics. Examining the specific characteristics and healthcare service use of this group presents a new and needed set of data to drive important programmatic change.

203.004 (Panel Discussion) Health of Latinx Transition-Age Youth

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Background: The Latine population has been rapidly growing in the US, reaching 62.5 million in 2021. The rapid growth has designated the Latine population as the largest ethnic group in the United States. Improved methods of diagnosis and heightened autism awareness, has increased the identification of autism among Latine children and youth in recent years. This improvement in early detection of autism and associated efforts in early intervention for Latine children have been promising for young children and families. Yet there is very little investment in understanding and supporting the growing youth and adult Latine autistic populations. Understandably, the greater number of early diagnoses, suggests an expected surge in youth and adult Latine autistic individuals in need of care. To serve their needs it is necessary that we have an understanding of their demographics, living circumstances, as well as physical and mental conditions. Large datasets, such as the National Medicaid claims database which provides substantial number of individuals with disabilities services across the lifespan, offers opportunities to explore these areas among racial/ethnic subgroups.

Objectives: The objective of this study is to explore the demographics of the Latine autistic subgroup within the 2016 National Medicaid claims database.
Methods: This study utilized national (US) Medicaid claims for the year 2016 from 50 states to explore demographics among the Latine subsample of autistic service users. Diagnoses of autism, ID, and chronic conditions were identified using validated algorithms from the Chronic Condition Warehouse (CCW), which have also been used in the majority of autism research to date. Tables were generated using data from the T-MSIS Analytic File Medicaid claims data.

Results: Of the total number of Medicaid beneficiaries (n=894,529), n=185,540 were Latine and had an autism diagnosis. White autistic Medicaid beneficiaries were the largest racial group (62.9%) followed by Black beneficiaries (18.6%) in the all other races group. Twenty percent of the Latine autistic subgroup were also classified with an intellectually disability. Ages ranged <18 to 65+y, with most of the sample (82.9%) falling in the <18 age group, followed by the 22-40 age group. Of the Latine autistic Medicaid beneficiaries, 78.8% were male, and 86.9% lived in urban areas. Most Latine autistic beneficiaries were eligible for Medicaid due to disability (56.9%), followed by eligibility due to poverty status (31.2%). Approximately 17% of the Latine autistic beneficiaries had one chronic condition, with 4.5% having 2 or more chronic conditions, and the remaining having none. Lastly, the majority of Latine beneficiaries resided in California (n= 47,647) with the fewest living in Idaho and West Virginia (suppressed).

Conclusions: The present study provides a glance of autistic Latine Medicaid beneficiaries. By exploring the demographics of this group we set the stage for future analyses of services and factors that contribute to service access among autistic Latine Medicaid beneficiaries. This study provides implications for state and national health care programs and policies. Despite the promise of the study, it includes several limitations. For instance, the scope of the data did not allow for separate analyses of Latine subgroups.
Conclusions: Racial and ethnic disparities in the quality of developmental assessment records may contribute to previous reports of excess prevalence of ASD among White relative to Black and Hispanic children in the United States and point to the need to improve health equity and quality of ASD diagnoses and services.


Background:

Every two years, the U.S. Centers for Disease Control and Prevention’s Autism and Developmental Disabilities Monitoring (ADDM) Network conducts cross-sectional, population-based surveillance of autism spectrum disorder (ASD) prevalence among 8-year-old children. The ADDM Network critically examines variation in ASD prevalence by race/ethnicity as significant differences in ASD prevalence across race/ethnicity may suggest under-identification in certain populations. Little is known about ASD prevalence among American Indian/Alaska Native (AIAN) children as the ADDM Network has not generally reported on prevalence due to low numbers of AIAN children preventing stable estimates. An improved understanding of ASD prevalence among AIAN is essential for meeting the service needs of individuals with ASD in AIAN communities.

Objectives:

To estimate ASD prevalence among 8-year-old AIAN children by study year, examine change in prevalence over time, and compare ASD prevalence among AIAN children with prevalence among children from other race/ethnicity groups.

Methods:

8-year-old children with ASD were identified in ADDM Network sites from 2002-2018, and categorized into five race categories (i.e. Asian/Pacific Islander (Asian), Black, non-Hispanic (Black), White, non-Hispanic (White), Hispanic, and AIAN). Population denominators were from the National Center for Health Statistics’ bridged-race postcensal population estimates using the most recent vintage available at the conclusion of each study year. Public school enrollment counts were used to adjust denominators in sites with subcounty surveillance areas. Overall and race/ethnicity-specific prevalence estimates were calculated by study year as the number of children with ASD divided by the number of children per group per 1,000 children. The Wilson score method with continuity correction was used to estimate 95% confidence intervals (CI). Prevalence ratios (PR) and 95% confidence intervals using Wald’s method were estimated across race/ethnicity and study years.

Results:

There were fewer AIAN children in the sample compared to other racial/ethnic groups (Table 1), and precision of ASD prevalence estimates among AIAN children was poor (Figure 1). ASD prevalence among AIAN children increased significantly from 2.8/1,000 8-year-old children in 2002 to 29.0/1,000 8-year-old children in 2018 (PR: 10.1, 95% CI: 4.5-22.5). ASD prevalence among other race/ethnicity groups did not show as large of an increase (Figure 1). Few significant differences in ASD prevalence were detected between AIAN children and other children with the exception of the AIAN:White ratio in 2002 (PR: 0.4, 95% CI: 0.2-0.8) and 2016 (PR: 0.7, 95% CI: 0.4-1.0), and the AIAN:Hispanic ratio in 2008 (PR: 1.6, 95% CI: 1.1-2.4; Table).

Conclusions:

These results should be interpreted with caution given low precision of prevalence estimates. Although ASD prevalence among 8-year-old AIAN children increased over 10-fold from 2002 to 2018, it rarely differed from the prevalence measured in other groups within study years. Even with pooling data across sites, sample sizes remained too small in most years to yield precise estimates impacting comparisons of ASD prevalence in AIAN children to other race/ethnicity groups. This suggests that additional efforts may be needed to increase the inclusion of AIAN children in population-based ASD surveillance systems such as ADDM to provide more precise ASD prevalence estimates.

309.003 (Oral) Prenatal Stress, Maternal Immigrant Status and Child Autistic Traits: Insights from a Population-Based Cohort Study.

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Background: There is emerging evidence for an increased risk of Autism Spectrum Disorder (ASD) in children of immigrant parents. To date, the mechanisms underlying this relationship are poorly understood.

Objectives: To investigate prenatal exposure to maternal stress as a mediating pathway between maternal immigrant status and child autistic traits.

Methods: We applied a longitudinal mediation analysis embedded in the Generation R Study, a population-based cohort study from fetal life onwards in the Netherlands. Of the 4727 included participants, 1773 mothers had a migration background. Prenatal maternal stress occurring in various aspects of life was assessed, using questionnaires related to psychopathology, self-esteem, life events, family functioning, long-term difficulties, social support and perceived discrimination. Child autistic traits were measured at age 6 with mother reports on the Social Responsiveness Scale (SRS-short). Multiple mediation analysis was performed making use of a regression-based path analysis and of bootstrapping.

Results: Children of mothers with a migration background had higher scores on the SRS-short (n=1773, M=0.48, SD=0.25), thus indicating more autistic traits, compared to children of mothers with no migration background (n=2954, M=0.38, SD=0.23) (p <0.001). In addition, mothers with a migration background experienced significantly more stress in almost all aspects of life (p <0.05), except in relation to self-esteem. The total mediating effect of prenatal stress indicators on the relationship between maternal immigrant status and child autistic traits after adjusting for socioeconomic factors, birth weight, gestational age at birth and gender of the child was 31.3% (95% CI 29.6 to 32.2). Stress indicators with the highest mediating effect were poor family functioning (12.5%, 95% CI 11.5 to 13.7) and perceived discrimination (11.9%, 95% CI 8.8 to 13.9). In the group of mothers with a migration background from outside Europe (n=1390), the mediating effect of maternal stress indicators was 35.1% (95% CI 32.8 to 36.3), with an effect of perceived discrimination of 20.8% (95% CI 18.5 to 22.3, see also figure 1 and table 1).

Conclusions: Maternal stress during pregnancy, especially related to social discrimination and poor family functioning, seems to be an important mediator in the association between maternal immigrant status and child autistic traits in the Netherlands. Prevention programs and early interventions in clinical practice should focus on reducing the exposure to prenatal stress, in particular amongst women with a migration background.

309.004 (Oral) Risk Factors for Autism Spectrum Disorder on the Kenyan Coast
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Background: Evidence from population-based studies in the Global North has identified the role of environmental risk factors in the aetiology of neurodevelopmental disorders (NDDs), such as autism spectrum disorder (ASD). A limited number of case-control studies have identified various risk factors associated with NDDs in Africa. One such study by Mankoski and colleagues in 2006 found evidence of falciparum malaria as a possible antecedent to ASD in Tanzania. Widely researched risk factors such as pre-eclampsia, placental insufficiency, prolonged labour, induced labour, birth asphyxia, preterm birth and low birth weight are common in Africa. Bleeding and maternal infection during pregnancy and advanced paternal age have also been linked to ASD.

Objectives: This study aimed to identify unique prenatal, perinatal, and postnatal factors associated with ASD in Coastal Kenya, comparing children with ASD and other children with NDDs as well as typically developing children. The study combines data from two studies—an ongoing case-control study that aims to characterise the genetics and phenotypic architecture of children with NDDs (NeuroDev Study) and a concluded study that aimed at validating an ASD-specific screening tool and thereafter collected data on risk factors associated with ASD (Autism Study).

Methods: The study was conducted in Kilifi and Mombasa counties along the Kenyan Coast. We included 172 of the study participants from the Autism Study and 151 from the NeuroDev Study who had a diagnosis of at least one NDD (cases) and 112 and 73 with no NDD diagnosis (controls) from each study, respectively. Case participants were recruited from special schools, a database of participants from previous studies and the neurology clinic in Kilifi County. An unadjusted analysis of the potential risk factors was carried out using logistic regression. Risk factors with a p-value reaching 0.25 were included in the adjusted analysis. Analyses were conducted in STATA version 15.0.
Results: 25 possible medical and socio-demographic factors associated with ASD and NDDs compared to the typically developing group were explored in the unadjusted analysis. 13 factors were included in the preliminary adjusted analysis. Medical complications during pregnancy, labour and birth complications, and previous hospitalisations in childhood were associated with an increased risk for ASD and NDDs, reaching the statistically significant cut-off <0.05 with odds ratios ranging from 1.46 to 7.99. Infection during pregnancy and head injury/coma were linked to an increased risk associated with ASD, with odds ratios ranging from 1.89 and 2.59, respectively. Low birth weight and birth order showed a relatively reduced risk for ASD only, with odds ratios of 0.83 and 0.90, respectively.

Conclusions: This study contributes to the growing evidence of a link between prenatal, perinatal, and postnatal factors and ASD. Infection during pregnancy and head injury/coma were potentially unique factors associated with ASD. More research is needed to understand the biological mechanisms of these factors. Knowledge of the association between these factors and ASD could lead to an early assessment of ASD in children at risk and enhance early diagnosis and intervention.

### Oral Session — Epidemiology

#### 324 - Epidemiological Studies of Autism Traits & Comorbidities

**Moderator: Mayada Elsabbagh, McGill University, Montreal, QC, Canada**

**324.001 (Oral) Prevalence and Patterns of Co-Occurring Mental Health Conditions and Intellectual and Developmental Disabilities Among Autistic Youth and Young Adults**


Background: Compared to non-autistic people, research suggests that autistic people are at an increased risk for co-occurrence of mental health (MH) conditions and intellectual and developmental disabilities (IDD). However, few studies have large enough samples to examine multiple co-occurring MH conditions and IDD among autistic people (i.e., prevalence of 2+ co-occurring conditions) which may more appropriately reflect the lived experiences of autistic youth and young adults.

Objectives: Among autistic youth and young adults we sought to understand the prevalence of and common combinations of multiple co-occurring conditions within the domains of MH and IDD and the sociodemographic characteristics of those with multiple co-occurring conditions.

Methods: Using national public health insurance (Medicaid) data from 2016 (among the most recently available), we conducted a cross-sectional analysis of autistic youth and young adults across the US. Autistic individuals ages 8-25 enrolled in Medicaid were eligible. We used validated algorithms for identifying co-occurring conditions in claims data (1+ inpatient or 2+ outpatient claims with an ICD-10 code for that condition of interest). MH conditions and IDD of interest included: Attention-deficit/hyperactivity disorder (ADHD), anxiety disorder, bipolar disorder, depressive disorder, intellectual disability (ID), learning disability (LD), other developmental disability (DD), epilepsy, personality disorders, post-traumatic stress disorder, and schizophrenia. Prevalence of 0, 1, 2, 3, or 4+ co-occurring conditions was calculated as the number with the respective number of co-occurring conditions divided by total number of autistic youth and young adults. For each prevalence group (e.g., 2 co-occurring conditions), we ranked the frequencies of most common combinations of co-occurring conditions. Descriptive statistics were calculated for demographic and enrollment characteristics and compared between those with 4+ co-occurring MH conditions or IDD and those with less than four. We chose 4+ co-occurring conditions as our cutoff because in this insurance system and for this age group prevalence of more than 4 co-occurring conditions of interest was rare.

Results: Among autistic youth and young adults (N = 1,285,210), 10% had zero, 45% had one, 26% had two, 12% had three, and 7% had four or more co-occurring MH conditions or IDD. Table 1 provides the top 5 co-occurring conditions of interest autistic youth and young adults and one co-occurring condition of interest which were ADHD (32.9%), ID (29.9%), LD (14.5%), Anxiety (8.3%) and Epilepsy (5.4%). The five most common combinations of co-occurrence among those who had 2 conditions were: 1) LD & DD (15.6%), 2) ADHD & ID (10.1%), 3) ADHD & anxiety (9.6%), 4) ID & LD (9.3%), and 5) Epilepsy & ID (8.7%). A higher proportion of those with four or more conditions were females (39.2% vs 31.3%) and ages 13-17 (35.3% vs. 30.7%) compared to those with less than four conditions.

Conclusions: We observed a high prevalence of multiple co-occurring conditions in the domains of MH and IDD among autistic youth and young adults, dominated by ADHD, ID, and LD co-occurrence. Understanding the co-occurrence of these conditions can help policymakers to shape program access and service availability to match the needs of autistic youth and young adults.

Background: Children with ASD frequently have co-occurring medical and psychiatric conditions that can affect their longitudinal course and function. Parent-report rating-scales, such as the Child Behavior Checklist (CBCL), can be useful in characterizing behavior and emotional development in large population samples and have been examined in ASD. Several studies have explored if relationships between ASD and emotional/behavioral problems vary by child sex, and if severity of ASD-related traits is associated with increased behavioral and emotional problems.

Objectives: Our goals were to: 1) examine the occurrence of emotional and behavior problems in children with and without ASD in a large national sample, stratifying by sex, and 2) evaluate if children with increased ASD-related social communication deficits also experience more behavioral and emotional problems.

Methods: Participants (n=7,978) were drawn from 43 cohorts from the Environmental influences on Child Health Outcomes (ECHO) program. Information on demographic factors, parent-report of an autism diagnosis by clinician, Social Responsiveness Scale (SRS) scores, and CBCL scores were obtained for children aged 2.5-18 years by parental surveys. We examined mean differences in CBCL total and DSM-oriented subscale scores by ASD diagnosis and by child sex. Analyses using logistic regression were conducted to examine if ASD was associated with higher CBCL scores. We further examined if these relationships differed by child age category (<5 years, 6-11 years, 12+ years). The relationships between SRS score and CBCL total and subscale scores were examined using quantile regression models, with analyses adjusted for child sex.

Results: In ECHO, 552 children were reported by a parent to have a clinician diagnosis of ASD (n=431 boys, 121 girls). After adjusting for sex, children with ASD were more likely to have CBCL total problems scale score greater than the 50th percentile (50-70th percentile (OR=1.76, 95% CI (1.49-2.09), 71-90th percentile (3.23(2.39-4.38), or top 10th percentile (7.10(4.35-11.60))) compared to children without ASD. Among children with ASD, girls had a higher mean difference on the depression (beta=1.48, p=0.05) and anxiety (beta=1.35, p=0.03) DSM-5 oriented subscales compared to boys. These relationships were also present for the CBCL DSM-5 oriented subscales reflecting depression, anxiety, and ADHD, and were confirmed across age groups when stratified by age group in stratified analysis. In quantile regression analyses, we observed evidence of stronger associations between SRS and CBCL for those in higher quantiles of CBCL total problems scale score (beta representing 1-unit change in SRS associated with 1-unit increase in CBCL total problems scale score), among children in the 70-90th percentile (beta=1.60, p<0.01), or top 10th percentile (beta=2.43, p<0.01) of the CBCL total problems scale score distribution. Similar findings were seen for the DSM-5 oriented depression and anxiety subscales.

Conclusions: Results from this large national sample suggest increased behavioral and emotional problems among children with ASD compared to those without. Girls with ASD were more likely to have parent-reported depression and anxiety. High social communication deficits may warrant increased monitoring for co-occurring behavioral and emotional problems.

324.003 (Oral) Use of the Social Communication Questionnaire As a Measure of Autistic Traits in the General Population: Psychometric Properties and Measurement Variance By Sex and Autism Diagnostic Status

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Background: The psychometric properties of the SCQ have primarily been assessed in clinical samples of children diagnosed with autism. However, it is also commonly used to assess for signs of autism in primary care settings and general population samples in research.
Additionally, concerns have been raised about potential sex differences in psychometric properties of autism screeners such as the SCQ, and these may be difficult to detect in clinical samples which may already have a sex bias in selection and ascertainment.

Objectives: We aim to explore the factor structure of the SCQ in a large population-based sample and compare it to other proposed factor structures from clinical cohorts. Additionally, we assess for potential measurement variance by sex and autism diagnostic status.

Methods:

Using data from the Norwegian Mother, Father and Child Cohort study (MoBa), we perform exploratory factor analysis in one-half of an eligible child sample at age 8 (n = 21,814) and confirmatory factor analyses in the other (n = 21,711) comparing our observed factor structure to other theoretical structures in the literature. We additionally compare these models in a subsample of children who received autism diagnoses in the Norwegian Patient Register between 2008 and 2018 (n = 436). Finally, we conduct measurement invariance testing by sex (ascertained from birth registry) in a general population and across registered autism diagnostic status.

Results: Factor analyses find that a 7-factor solution fits the data substantially better than any of the alternative theoretical models in both the full sample and the autism diagnosis subsample. Measurement invariance testing found the factors can be assumed to have the same structure, loadings, and thresholds between males and females. However, a few items show some evidence of differing effects in residual variances potentially biasing the measurement of the specific trait, the strongest example being for item 13 which measures having unusually intense special interests. The factors’ structure was found to be the same between the diagnosed and non-diagnosed subsamples but differed in the estimated loadings and thresholds of the items. For example, there were differences in the manifestation of the idiosyncratic speech factor, which was characterized primarily by repetitive speech in the diagnosed sample but had more uniform effects across all speech items in the non-diagnosed sample.

Conclusions:

Our results find high dimensionality underlying the SCQ in the general population, indicating that using sum scores based on broader domains may obscure more specific effects. We find evidence supporting that the factor structure is the same between autistic and non-autistic individuals but with some differences in the degree by which factors affect traits. Surprisingly, we find few significant sex differences in the structure, loadings, and thresholds of items measuring autistic traits in a general population. However, in the few areas where differences in estimated residual variances for traits between females and males were observed, we caution that sex differences in observed scores could be partially attributable to differences in the sensitivity of the instrument rather than in the underlying behaviors.

Background: Autistic individuals have an increased risk of self-harm, including an elevated risk of death from suicide. However, the pathways to suicide in this group, and whether they differ from that among non-autistic people, is not well known. Thus, while non-fatal self-harm is strongly associated with death from suicide in the general population, the relationship has not been thoroughly investigated among autistic people. It is also unclear if the relationship between self-harm and suicide in autism is different among females as compared to males, and whether it varies by the method of self-harm.

Objectives: This study examined whether the relationship between self-harm and risk of death from suicide differs between autistic and non-autistic individuals. It also set out to explore if sex and the method of self-harm further modifies this association.

Methods: We used the Swedish health and administrative registers to establish a total population cohort of 2,822,789 individuals who we followed from age 12 up to age 37 years, by 2021. Autistic individuals were identified by pre-existing diagnosis of autism (N=86,427) in the National Patient Register. Self-harm was also ascertained from this register and included any hospital admissions or emergency department visits for self-inflicted injury or poisoning. Death from suicide was identified from the Cause of Death Register. Parental level of education and psychiatric history were also assessed, as were other individual level neurodevelopmental disorders. We used Cox proportional hazard regression models to estimate adjusted hazard ratios (aHR) and confidence intervals (CI) for suicide in relation to a cross-classification of autism and any hospital presentation for self-harm overall and by method. The analyses were conducted in the total cohort and separately among males and females.

Results: We observed a strongly increased aHR of death from suicide in individuals who had presented to health services for self-harm. This risk was clearly more pronounced in autistic as compared to non-autistic individuals (adjusted Hazard Ratio [95 % Confidence Interval] : 22.9 [19.5-26.9]) and 16.2 [14.9-17.5], respectively), and particularly noticeable among autistic females and autistic individuals.
who presented with self-cutting. These associations were not explained by sociodemographic factors, family history of psychiatric disorders or other neurodevelopmental conditions among index persons.

Conclusions: Our findings underline the severity of clinical presentations of self-harm in young autistic individuals. These data demonstrate the need for further understanding and consideration of this issue in relation to research and clinical guidelines.

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**POSTER SESSION — EPIDEMIOLOGY**

**422 - Epidemiology I**

**422.116 (Poster) A Comparative Analysis of a Shortened Version of the Social Responsiveness Scale in Estimating an Established Autism Risk Factor Association in the Echo Program: Do We Get the Same Estimates?**

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Background: While autism spectrum disorder (ASD) is characterized as a binary diagnosis, evidence suggests a continuum of core traits that extend beyond diagnostic boundaries into the general population. The Social Responsiveness Scale (SRS) is a 65-item informant-tool and widely used quantitative measure of the autism-related phenotype and has been previously validated against ASD diagnosis. Prior work developed a shortened 16-item version of the SRS from the original 65-item measure using item response theory. However, its properties for use as a quantitative trait measure, including in epidemiologic risk factor analyses, have not been fully examined.

Objectives: Here, we compared the associations between gestational age (as a previously established risk factor associated with ASD) with the 65-item “full” and 16-item “short” versions of the SRS to test the shortened version’s utility in epidemiologic analyses of ASD risk factors.

Methods: Participants (n=2,760 with available item-level SRS information at time of analysis) were drawn from the Environmental Influences on Child Health Outcomes (ECHO) Program. The ECHO Program is a United States (US) based consortium of 69 cohort studies investigating the effects of environmental exposures on child health. SRS scores were collected via caregiver report when children were aged 2.5-18 years, where higher scores indicate the presence of more autism-related traits. Total scores were scaled to enable comparison across the short and full SRS. We then compared estimates of associations between gestational age and preterm birth status between the full and short SRS using multivariable linear regression, prediction methods, and quantile regression. Crude and adjusted models, including maternal (education and race/ethnicity) and child factors (sex and age at SRS administration) were run.

Results: In all analyses, adjusted associations supported increases in SRS scores (whether according to short or full scores) with preterm birth, and decreases with increasing gestational age. Overall, associations based on full and short SRS scores were highly comparable. For example, we observed positive associations between preterm birth with both full (β: 2.8; 95% CI: 1.7, 4.0) and short (β: 2.9; 95% CI: 1.6, 4.3) SRS scores. Quantile regression analyses indicated similar direction and magnitude of associations across the distribution of SRS scores between gestational age and both short and full SRS scores. These analyses revealed stronger, increasingly negative associations between gestational age and SRS scores from the 50th percentile (Full SRS: β: -0.3; 95% CI: -0.4, -0.2) to the 90th percentile (Full SRS: β: -0.6; 95% CI: -0.8, -0.4; Short SRS: β: -0.8; 95% CI: -1.0, -0.5) of SRS scores.

Conclusions: We observed a high degree of similarity in associations between gestational age, an established ASD risk factor, with full and short SRS scores in a sample of US children participating in the ECHO Program. The similarities in the direction and magnitude of associations observed between the full and short SRS suggest comparability of these for use as quantitative trait measures in risk factor analyses, though further work should address associations with other types of risk factors.

**422.117 (Poster) A Preliminary Assessment of the National Autism Screening Program in Sultanate of Oman: Lesson Learned from a Single Tertiary Care Centre Data**

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Background:
The National autism screening program was launched in the Sultanate of Oman early in 2017. The program adopted the Omani version of Modified Checklist for Autism in Toddlers, Revised /Follow-Up (M-CHAT/RF) as a tool for screening for autism and other developmental disorders mandated at 18 months of age for all children. The national guideline for autism screening classified the referral of screened positive cases into three autism diagnostic clinics in tertiary care hospitals, namely; Sultan Qaboos University and Royal Hospitals.

Objectives:

Hereafter, we are presenting a primary analysis of cases in Sultan Qaboos University Hospital (SQUH) to explore the performance of the screening program as a pioneer project in the Middle East area.

Methods:

The data was incurred from hospital electronic system of all cases diagnosed as ASD and presented to the clinic during the study period. In order to label a child with Autism Spectrum Disorder, the tertiary care clinics in Oman are espousing gold standard diagnostic procedures involving multidisciplinary assessment, Autism Diagnostic Interview-Revised (ADI™-R) and Autism Diagnostic Observation Schedule, Second Edition (ADOS™-2).

Results:

Between January 2017 and January 2020, a total of 624 autism spectrum disorder (ASD) cases were diagnosed in SQUH. Among those, 46 (7.4%) cases stemmed from the national screening program, while 578 (92.6%) came through the regular referral system from other sources. Although the program was still expanding during the last 3 years and didn’t reach its full potential – plus the interruption caused by the COVID-19 pandemic-36% of cases who were diagnosed before the age of 3 years came through the ASD screening program. The mean age of ASD diagnosis among the screened cases was 2.70 ± 0.81 years, while the mean age of diagnosis among the non-screened cases was 5.46 ± 2.30 years. Interestingly, 69.6% of the screened cases had a diagnosis before 3 years of age which allowed them to start early intervention. The difference was statistically significant (p-value < 0.000) as only 9.9% of the non-screened cases reached diagnosis before 3 years of age.

Conclusions:

Despite the fact that the above data originates from a single centre, it highlights the importance of the screening program in detecting ASD cases early and facilitating their referral for early intervention. However, it is recommended to conduct a full program evaluation within 2 years to evaluate the project activities, rectify flaws and perform a cost-effectiveness analysis.

422.118 (Poster) Adaptive Skill Differences in Race and Ethnicity in a Metropolitan Autism Center

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Background: Many state programs require scores from standardized measures, including adaptive skills, to qualify for benefits and services. Racial bias in standardized measures may differentially impact the ability of families of color to obtain services appropriate to the level and needs of their children.

Objectives: To conduct a top-down examination of differences between White children and children of other races to understand the presence and nature of inter-race differences in adaptive skill profiles in children seeking diagnostic evaluation in a high-throughput metropolitan hospital-based autism center.

Methods: Participants were n=793 children whose caregiver completed the Adaptive Behavior Assessment System, Third Edition (ABAS-3) as part of their visit. We examined differences in ABAS-3 composite and scaled scores dependent on the additive effects of race/ethnicity (American Indian n=23, Black n=80, Asian American/Pacific Islander n=93, Hispanic n=110, Unknown and Other Race n=54, and White n=433), insurance type (Medicare/Medicaid or non-Medicaid), and child age using linear regression. We focused comparison of non-White races against White races in a top-down approach examining the nature of any between-race effects.

Results: In general, family use of Medicaid was associated with lower adaptive skills in children compared to private insurance (e.g. GAC scores, p<.001). GAC scores were only lower in Black children relative to White children (p=.008). This was driven by differences in both Conceptual Composites (p=.004) and Practical Composites (p=.004), but not Social Composites (p=.149). In turn these composite differences were driven by Communication (p=.023) and Functional Academic (p=.001), but not Self-Direction (p=.052) or Functional Pre-Academics (p=.250) Conceptual sub-domain scaled scores; and by Community Use (p=.004), Home Living (p=.017), Health & Safety (p<.001), but not Self Care (p=.271) Practical sub-domain scaled scores. Interestingly, though GAC score differences were not observed,
Background: A growing body of literature suggests that exposure to early life air pollution is associated with increased risk for autism spectrum disorder (ASD). Recent studies have shown that community level socioeconomic status (SES) may modify the association between air pollution and child health outcomes. Few studies have examined the potential synergistic effects of neighborhood characteristics and air pollution exposure on ASD or associated traits.

Objectives: To examine the modifying role of neighborhood deprivation for the association between prenatal and postnatal ambient air pollution and ASD risk and ASD-related quantitative traits in children.

Methods: Data came from two prospective pregnancy cohorts enriched for a family history of ASD (n=409), Early Autism Risk Longitudinal Investigation (EARLI), Markers of Autism Risk in Babies – Learning Early Signs (MARABLES). Weekly air pollution exposures were estimated based on maternal residential address during pregnancy and the first year of life using inverse-distance squared spatial interpolation. Community socio-economic deprivation was derived from indicators in the American Community Survey data and categorized into tertiles: low, moderate, and high deprivation. Multivariable logistic and linear regression models were completed to evaluate the association between pregnancy and first year of life air pollution exposures and ASD diagnosis and ASD-related traits (Social Responsiveness Scale [SRS]) stratified by neighborhood deprivation. Distributed lag models examined sensitive windows of exposure between air pollutants and SRS by neighborhood deprivation.

Results: We observed an increased risk of having a child with ASD for each 1-unit increase in NO\(_2\) exposure during pregnancy (aOR=1.25 95% CI: 0.99-1.64, P=0.07) and the 1st year of life (aOR=1.51, 95% CI: 1.15, 2.10, P<0.01) in the low deprivation group. Inverse associations between air pollution during the 1st year of life and risk of ASD were observed for O\(_3\) (aOR=0.81, 95% CI: 0.64, 0.99, P=0.05), PM\(_{2.5}\) (aOR=0.62, 95% CI: 0.35, 1.03, P=0.08), and PM\(_{10}\) (aOR=0.79, 95% CI: 0.61, 0.97, P=0.04) in the low deprivation group. Increasing PM\(_{2.5}\) during preconception period was associated with lower SRS raw scores (less autistic traits) in the low deprivation group (weeks 1-5) and with higher SRS raw scores (more autistic traits) in the moderate deprivation group (weeks 1-12).

Conclusions: Our results suggest that air pollution impacts on ASD risk and ASD-related traits are present among children with higher SES (low or moderate neighborhood deprivation). Such results should be studied in the context of access to care indicators to better identify vulnerable populations or assess the role of diagnostic bias in ASD.

422.119 (Poster) Air Pollution Exposure, Autism Diagnosis, and Autism-Related Quantitative Traits By Neighborhood Deprivation


Asian children differed from White on the Social Composite (p=.006). This was driven by both Leisure (p=.039) and Social (p<.001) Social composite sub-domain scaled scores.

Conclusions: Even when controlling for age and insurance type, we see significant differences in conceptual, social and practical domains of adaptive behaviors between children of White to Black and Asian families. This exploratory study leads to larger questions of why Asian caregivers identify more social impairments, which includes both social and leisure skills, in their children compared with White caregivers’ rating of their children. Even starker differences were noted when comparing Black and White children in their community use, home living, health and safety, but not in their self-care skills. One may consider the impact race has on how a caregiver perceives the safety of their child in their community, as well as differences in access to developmental opportunities. Standardized measures are not able to account for such effects, yet they may impact who ultimately qualifies for benefits and services within their state. Limitations: families completing an ABAS may not be representative of the general population, e.g. cancellation rates in this sample were 19.8%, whereas for n=4855 comparison children referred for diagnostic evaluation average cancellation rates per individual were 29.1% (p<0.001). Replication as well as controls for multiple comparisons are needed.
Objectives: We are using whole genome sequencing-based variant analysis to assess the carrier genome influence on ASD. The experimental setup uses a meta-cohort of parents, siblings, and affected infants and will search for single markers as polygenic components.

Methods: Whole genome sequencing (WGS) was performed on 300 members including infants of families where ASD has already been observed in one child (sibling). Single nucleotide variants (SNV), small insertions and deletions (Indels up to ca 100bp), and copy number variants (CNV) were called by comparison to the genome build 38 and pools of (assumed) normals. Three analysis strategies were implemented. Firstly already identified genes potentially affecting ASD were analyzed for variants. Secondly variants segregating with propensity for ASD in the family or enriched in affected children across families were identified. Thirdly polygenic risk scores for ASD were calculated using different computational approaches. All analysis strategies implied the usage of multiple combined or alternative filtering strategies.

Results: On average ca 5 million variants were analyzed for each individual. Different filtering strategies were applied depending on the analytical pipeline. By setting a polymorphism filter at 5% population frequency in a similar context as that of the project, ca 90% of the variants could be set aside as normal polymorphism, leaving ca ½ million variants to analyze per genome. The variants or genotypes that were new to the affected persons (de novo / not inherited) were identified. The analysis for polygenic risk scores was performed on the complete set of variants subsampled from the cohort(s). Results of the different analysis strategies is presented.

Conclusions: Overall, our findings so far strengthens the vision of the not very strong influence of the carrier genome on the development of ASD. The identified polygenic risk scores might in specific populations contribute to the early identification of ASD. Further information will be provided due to ongoing sample collection.

422.121 (Poster) Antiseizure Medication Prescribing and Its Indications during Pregnancy and Offspring Neuro-Developmental Outcomes: A Study of Two Cohorts from the UK and Sweden
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Background: The teratogenic potential of valproate especially in relation to adverse neurodevelopmental outcomes is well documented. However, the safety of other anti-seizure medications (ASMs) during pregnancy is not well understood. Recent work has suggested that use of Topiramate during pregnancy may be a risk factor for neurodevelopmental outcomes including autism, intellectual disability (ID), and global developmental delay.

Objectives: To examine whether ASM prescribing in pregnancy and its indications are associated with adverse neurodevelopmental outcomes in exposed children.

Methods: This is an intergenerational study with prospectively collected data from the UK Clinical Practice Research Datalink (CPRD) GOLD (birth years 1995-2018) and the Swedish Developmental Origins of Health and Disease (DOHaD) dataset built from the national registers (birth years 1995-2020). CPRD GOLD holds primary care data from around 9% of the UK population and is approximately representative in terms of age and sex, while DOHaD contain information for nearly all births in the country. We identified maternal prescriptions for ASMs (carbamazepine, gabapentin, lamotrigine, levetiracetam, valproate, pregabalin, topiramate, or other) recorded during the pre-conceptional and pregnancy periods and their likely indications (including epilepsy, psychiatric conditions, and somatic conditions). Child neurodevelopmental outcomes included autism, attention deficit hyperactivity disorder (ADHD) and ID identified using Read codes and ICD-10 codes in the UK and ICD-10 codes in Sweden. We examined associations for prescribing any time in pregnancy, in each trimester, initiation during the first trimester and discontinuation early and late into pregnancy using log-binomial regression adjusted for confounders and year of birth (to account for differing lengths of follow up). Results in each cohort were pooled using fixed effects meta-analysis. We will implement exposure discordant sibling analyses, negative control analyses with a latent variable and other methods to aid with causal interpretation of findings.

Results: We have identified cohorts of 518,050 children in the UK and 2,666,272 children in Sweden. Prescription at any time in pregnancy was most common in lamotrigine in both countries (exposure prevalence for UK and Swedish cohorts found in Table 1). Associations with autism were found for carbamazepine (adjusted RR = 1.37; 95% CI = 1.18-1.59), topiramate (adjusted RR = 1.61; 95% CI = 1.14-2.27) and valproate (adjusted RR = 1.89; 95% CI = 1.62-2.20) but not lamotrigine (adjusted RR = 0.98; 95% CI = 0.86-1.13) in pooled analyses across the two cohorts (results from each cohort and from meta-analyses presented in Table 2). Analyses are ongoing and the results of causal inference methods will be used to investigate whether the reported associations are likely to reflect causal effects.
Conclusions: The results will help provide pregnant women and their clinicians with useful information to make informed choices about ASM use in pregnancy.

422.122 (Poster) Association between Parental Concerns about Their Child's Development during the First Year of Life and Subsequent Autism Spectrum Disorder Diagnosis

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Background:
Eliciting parents’ concerns about their child’s development is a key component of developmental surveillance. About 50% of parents of children with autism spectrum disorder (ASD) report having had concerns about their child’s development during the first year of life.

Objectives:
To assess whether parental concern about their child’s development during the first 12 months of age, is associated with later diagnosis of ASD, and to identify the child’s developmental characteristics associated with such parental concerns.

Methods:
In this retrospective matched case-control study, data about developmental milestones and parental concerns from the first 12 months of life was compared between 280 children with ASD and 560 children with typical development that were matched to cases based on their age, sex, and ethnicity. Data about the participants’ developmental milestones and parental concerns at ages of 2, 4, 6, 9 and 12 months of age were obtained from the computerized database of the Ministry of Health Maternal and Child Health Centers (MCHCs) in southern Israel. Differences between groups and the association between parental concerns, ASD and child’s developmental characteristics were assessed using standard univariate statistics.

Results:
At 2, 4, 6, 9 and 12 months, 0.6%, 0.3%, 1.4%, 4% and 4.9% of the parents in the sample raised concerns about their child development. Notably, over half of the children whom their parents raised concern about their development were subsequently diagnosed with ASD. This association between parental concern and ASD was the most striking at age 12 months with 34 of the 39 children (87%) whom their parents raised concern were subsequently diagnosed with ASD (p<0.001). Parental concerns were significantly associated with failure in mastering developmental milestones during the first year of life (OR=13.489; 95%CI = 3.276-55.545). This association was the most prominent at age 4 months (OR=3.029; 95%CI =1.687-5.440). Notably, parental concerns were most strongly associated with failure in language developmental milestones (OR=5.274; 95%CI = 2.811-9.913).

Conclusions:
Our findings suggest that parental concerns for their child development during the first year of life are important factor in screening for early signs of ASD at this age.

422.123 (Poster) Association between the Financial Impact of COVID-19 Pandemic and Mental Health of 5 Years Old Children with Neurodevelopmental Traits in Japan

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Background: COVID-19 pandemic has affected not only our physical health but also our mental health and worldwide economy. The impact of financial problem caused by the pandemic on mental health of children with neurodevelopmental traits is not well known.

Objectives: This study aimed to investigate the association between the financial impact of COVID-19 pandemic and mental health of 5-year-old children with neurodevelopmental traits.

Methods: The subjects were recruited from participants in the 5-year-old developmental checkup in Hirosaki city, Japan. In fiscal year 2021, 1130 children and their caregivers participated in it. The caregivers of 919 children consented to this study (participation rate was 81.3%, boys: girls =506:413). The Japanese versions of following measures were used: CRISIS AFAR, a questionnaire about COVID-19;
the Autism Spectrum Screening Questionnaire (ASSQ); the parent-rated Strength and Difficulties Questionnaire (SDQ). The CRISIS AFAR includes questions about children’s daily behaviors and Emotions/worries. The SDQ subscales are “Emotional Symptoms” (SDQ-ES), “Conduct Problems” (SDQ-CP) et al, these subscales and total score are classified as “Low need”, “Some Need” and “High Need”, according to the previous report. Statistical analysis was performed using Spearman correlation coefficient (p<0.05).

**Results:** 5.3% of caregivers had an annual household income of less than $1,400. In particular, 33.7% of single-parent family had an annual income of less than $1,400. Spearman correlation coefficient showed that negative correlation between annual incomes and financial problem by COVID-19 pandemic (p=-0.313, p<0.001). When analyzed as a whole, there wasn’t much correlation between children’s worries about infection and ASSQ, SDQ, and financial problem. When analyzed for children with ASSQ>19, spearman correlation coefficient showed that positive correlations between financial problem and “Worries about their family/friend’s infection” (p=0.476, p>0.019), “Talk about infections” (p=0.440, p=0.028). When analyzed for children with Some/High Need in SDQ-ES, spearman correlation coefficient showed that positive correlations between financial problem and “Worries about own infection” (p=0.246, p=0.015), “Worries about physical health” (p=0.202, p=0.048) and “Worries about mental health” (p=0.209, p=0.041). When analyzed for children with Some/High Need in SDQ-CP, spearman correlation coefficient showed that positive correlations between financial problem and “Worries about infection” (p=0.237, p>0.004), “Worries about their family/friend’s infection” (p=0.273, p>0.001), “Worries about physical health” (p=0.276, p>0.001) and “Worries about mental health” (p=0.245, p>0.003). When analyzed for children with Some/High Need in SDQ-total, spearman correlation coefficient showed that positive correlation between financial problem and “Worries about own infection” (p=0.238, p>0.005), “Worries about their family/friend’s infection” (p=0.301, p>0.001), “Worries about physical health” (p=0.247, p>0.004), and “Talk about infections”(p=0.235, p>0.006). From the above; 1) Families with lower incomes, especially single-parent families, are more affected by COVID-19 pandemic. 2) As for children with ASSQ>19 or Some/High Need in SDQ-ES, SDQ-CP, SDQ-total, the greater the financial problem, the more they worry about own/family/friend’s infections, physical/mental health, and talk about infections.

**Conclusions:** This study showed the correlations between the economic impact of COVID-19 pandemic and mental health of 5 year old children with neurodevelopmental traits. We should take each financial problem into account when we assess the impact of COVID-19 pandemic on children’s mental health.

422.124 (Poster) Autism Spectrum Disorder Prevalence in Somali Children in Minnesota: Data from the MN-ADDM Study
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Background: Minnesota has the largest Somali cultural community in the U.S., an estimated 82,890 people (Minnesota Compass, 2020; https://www.mncompass.org/topics/demographics/cultural-communities/somali). Our surveillance projects have tracked autism prevalence in Somali children in Minnesota since 2010. This work arose from community concerns that Somali children had higher rates of autism, and a form of autism with greater support needs, than other children. To date, prevalence estimates in the Twin Cities metro area have not yet detected higher prevalence of autism for Somali children. However, rates of co-occurring intellectual disability (ID) varied, with some study years showing significantly higher rates of autism with ID in Somali children (Hewitt et al., 2016; Esler, Hall-Lande, & Hewitt, 2017) and some study years showing no differences. Small sample sizes have limited interpretability of these results.

**Objectives:** We will compare autism prevalence in 4- and 8-year-olds across racial/ethnic groups using data from the Minnesota site of the CDC Autism and Developmental Disabilities Monitoring Network (ADDM), surveillance years 2018 and 2020, including Somali children. We will also compare co-occurrence of ID in autistic children across racial/ethnic groups.

**Methods:** We will combine data from 2018 and 2020 surveillance years to obtain adequate sample sizes to compare prevalence across our populations of interest. Data analysis from 2018 is complete, and analysis of 2020 data is in progress. Prevalence calculations utilize standardized ADDM methods (Maenner et al., 2021) involving systematic review of health and special education records of 4- and 8-year-old children within our surveillance area. The area includes three large urban counties that house four of the five largest school districts in Minnesota. Population denominators were from the National Center for Health Statistics’ bridged-race postcensal population estimates using the most recent vintage available at the conclusion of each study year and adjusted to include only children living in the surveillance area. A child is classified as Somali based on reported home language in education and health records.

**Results:** In surveillance year 2018, prevalence estimates for 8-year-olds revealed lower autism prevalence for Hispanic children compared to Somali and non-Somali Black children. Sample sizes were too small to compare rates of co-occurring ID for Somali children. Among 4-year-olds in 2018, higher autism prevalence was found for Somali children compared to White, non-Somali Black, and Hispanic children. Sample sizes were small, but 95% of autistic Somali 4-year-olds had ID compared to an overall ID rate of 57%. Prevalence estimates and rates of co-occurring ID from combined surveillance years 2018 and 2020 will be compared across racial/ethnic groups assuming a Poisson distribution. Chi squared and Fisher’s exact tests will be used to identify differences between populations.

**Conclusions:** Because early identification and intervention can improve outcomes, identifying subgroups of children with a higher prevalence of autism or with greater support needs can inform public health policy and improve developmental growth for autistic
Background:

There is significant interest in understanding reasons for the rapid increase in measured ASD prevalence over the last few decades. In the U.S., the Centers for Disease Control and Prevention’s Autism and Developmental Disabilities Monitoring (ADDM) Network is the primary source for ASD prevalence estimates. These estimates are critical to assess and plan for needed care, funding, and community resources. While ASD prevalence was previously thought to peak at age 8, previous research demonstrates only two-thirds of people with ASD are identified by this age. Monitoring change in ASD overtime within multiple birth cohorts (BC) through early adulthood may provide more accurate estimates of ASD prevalence than estimates based cross-sectionally on 8-year-olds.

Objectives:


Methods:

ASD identification in the 1994 and 2002 birth cohorts was based on International Classification of Diseases, ninth or tenth revision codes for autism and/or an autism special education eligibility. ASD ascertainment was conducted statewide from birth through 2018; age at earliest identification was identified. The population size from birth through 2018 was identified by age and sex from the National Center for Health Statistics' bridged-race postcensal population estimates using the latest vintages. The cumulative incidence was measured as the number of children identified with ASD at or before each year of age divided by the total population at or before each year of age. Prevalence, risk ratios (RR) and associated 95% confidence intervals were estimated.

Results:

The cumulative incidence of ASD was significantly lower in the 1994 versus the 2002 BC in 2018 (20.0 vs 31.3; RR = 0.50, 95% confidence intervals (CI): 0.46-0.55; Figure 1). In both cohorts, the cumulative incidence of ASD was significantly higher in 2018 than at age 8 (1994 BC: 20.0 vs 7.4, RR: 1.90, 95% CI: 1.66-2.17); 2002 BC: 31.3 vs. 22.2, RR: 1.64, 95% CI: 1.27-1.48). ASD prevalence in 2018 in the 1994 BC was significantly lower than in the 2002 BC (14.8/1000 versus 29.5/1000; RR= 0.49, 95% CI: 0.45-0.54; Figure 2). A plateau in ASD cumulative incidence appears to begin at age 16 in the 1994 BC; whether a similar plateau is occurring in the 2002 BC by age 16 is yet unclear but is suggested.

Conclusions:

Utah’s ASD identification at health and school settings continues into adolescence for both the 1994 and 2002 birth cohorts. The cumulative incidence appears to plateau after 16 years old, which may suggest that Utah’s peak incidence occurs at 16 instead of 8. The significant increase in ASD prevalence between 1994 and 2002 birth cohorts suggests a corresponding two fold increase in diagnostic and intervention service needs, funding, and community resources over the past 20 years. ASD service planning in Utah, however, is currently informed by single age, single birth cohort studies and may not correspond with population need.
Background: Prior work has demonstrated differences in autism prevalence by demographic factors. Whether observed differences are due to differential access to care, traits at presentation, or true differences in rates has been debated.

Objectives: Our goals were to compare 1) associations of demographic factors with both autism diagnosis and quantitatively-assessed autism-related traits according to the Social Responsiveness Scale (SRS), and 2) the ability of the SRS to predict autism diagnosis across categories of maternal race/ethnicity and education, key demographic factors previously associated with diagnosis.

Methods: Participants (n=8,224; 4,279 boys, 3,945 girls) were drawn from 46 cohorts with children born from 1999-2019 from the Environmental influences on Child Health Outcomes (ECHO) program. Information on demographic factors, parent report of an autism diagnosis by a doctor or clinician, and SRS scores from children aged 2.5-18 years was obtained. Relationships between demographic factors and autism diagnosis, and separately, demographic factors and SRS scores above a threshold typically consistent with autism diagnosis (SRS T score >65) were compared based on estimated odds ratios (OR) and 95% confidence intervals (CI) from generalized linear mixed models with random effects for individual cohorts. Adjusted analyses were mutually accounted for race/ethnicity and education, as well as maternal age, BMI, and cohort; we also tested for effect modification by sex in stratified models. Differences in predictive ability across demographic groups were determined using receiver operating characteristic (ROC) analyses of SRS scores predicting autism diagnosis, and area under the curve (AUC) values across racial and ethnic groups as well as education level were compared from these models.

Results: Approximately 60% of participants identified as non-Hispanic White, nearly 20% as non-Hispanic Black, and 15% as Hispanic; approximately 25% of parents fell in each of 4 education levels. In adjusted regression models, the odds of autism diagnosis were lower for Non-Hispanic Black children (OR=0.72, 95%CI 0.53, 0.98), but similar for Asian and Hispanic children, relative to Non-Hispanic White children. In sex-stratified analyses, this association appeared to be driven by reduced odds of reported diagnosis in Black females. In comparison, no significant associations of race/ethnicity with odds of SRS scores>65 were seen. Higher maternal education was significantly associated with reduced odds of autism diagnosis (OR=0.57, 95% CI 0.41, 0.79 for graduate vs. high school degree) and, even more strongly, with SRS T-score>65 (OR=0.35, 95%CI 0.26, 0.47). In ROC analyses, prediction of autism diagnosis by SRS scores was strong for all groups (AUC>0.8), but lowest for Non-Hispanic Black (AUC=0.84, p=0.007 compared to the non-Hispanic white children, AUC=0.93), and for those with the lowest education (AUC=0.81, p<0.001 compared to all other education groups).

Conclusions: Results from this large nationwide sample suggest lower diagnostic recognition of autism in non-Hispanic Black children from cohorts born 1999-2019, particularly in girls, despite a similar degree of reported autism-related traits falling in the clinically elevated range. Further work is needed to address this disparity, reduce barriers to diagnosis in underserved groups, and understand sex differences in ASD recognition.

422.127 (Poster) Differential Relationship between Low Birthweight and Risk across ASD and ID Outcomes By Maternal Race and Ethnicity

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Background: Fetal growth is influenced by several maternal and obstetrical factors and is an important indicator of fetal health. Low birthweight, which is known to vary by race/ethnicity, is an established risk factor for autism spectrum disorder (ASD) and intellectual disability (ID). Prevalence rates across ASD/ID disability category (i.e., ASD only, ASD+ID, ID only) differ substantially between White (NHW) and Black (NHB) children of non-Hispanic origin. Race/ethnic disparities in birthweight and disability prevalence are only partially attributable to differences in maternal socioeconomic factors. Further exploration of the relationship between birthweight and risk for ASD and ID by race/ethnicity is warranted in a racially and geographically diverse population.

Objectives: Using a case-cohort design, this study evaluates the relationships between ASD/ID risk and birthweight by race/ethnicity for children ascertained with ASD/ID across sites participating in the U.S. Centers for Disease Control and Prevention’s Autism and Developmental Disabilities Monitoring Network (ADDN).

Methods: In even-numbered years 2000-2016, 8-year-old children were ascertained with ASD only, ASD+ID, and ID only (N=8643, N=3455, N=6174, respectively) using ADDN methodology, and linked to birth certificate records. The comparison cohort (N=1,464,932) was composed of all births ascertained through the National Center for Health Statistics corresponding to each birth year and ascertainment
Ascertainment areas were communities within Arizona, Arkansas, Utah, Maryland, Minnesota, Georgia, North Carolina, South Carolina, and New Jersey. Birthweight, maternal race/ethnicity, and covariates (i.e., sex, birth year, gestational age, maternal age, maternal education, gestational weight gain, maternal smoking) were obtained from birth records. ANCOVA using the Sidak correction for multiple comparisons was performed to measure least square mean (LSM) differences in birthweight across a 4-level variable of exposure: (1) other race/ethnicity (ORE) comparison group, (2) NHB comparison group, (3) ORE affected group, and (4) NHB affected group. ANCOVAs were formulated separately for each affected groups (i.e., ASD only, ASD+ID, ID only). The ORE cohort was composed of 66.6% NHW, 27.2% Hispanic, 6.1% non-Hispanic other. See Figure 1.

Results: The overall F statistics were significant for all ANCOVA models (p-values < 0.01). LSM birthweight in comparison groups was significantly lower for NHB (3220 grams, SE=1.08) than ORE children (3358 grams, SE=0.57, p<0.001). The comparison NHB group had a lower LSM birthweight than three of the four ORE groups: comparison, ASD only, and ASD+ID. While ASD only status was associated with significantly lower LSM birthweight for ORE children (versus comparison ORE, LSM difference=-28.47 grams, p=0.034), LSM birthweight did not differ between comparison NHB children and ASD only NHB children (LSM difference=0.82 grams, p=1.00). ID only NHB children had the lowest LSM birthweight across all groups.

Conclusions: Birthweight differed across disability categories: ASD only and ID only were associated with the highest and lowest LSM birthweights among affected groups within race/ethnicity category strata, respectively. While birthweight was significantly and consistently lower for NHB than ORE children across comparison and disability groups, birthweight was not associated with ASD only risk among NHB children. Mediation of health disparities adversely affecting neurodevelopment in NHB children should include optimizing maternal health and wellbeing during pregnancy.

**422.128 (Poster) Does Autism Manifest Differently in Girls and Boys?**

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Background:

Epidemiological studies suggest that prevalence of Autism Spectrum Disorder varies with gender, with males having 4-6 times higher chance of being diagnosed as having ASD. The difference in prevalence has been attributed to multiple factors like better coping mechanisms in females, genetic/epigenetic factors and hormonal influences. However, existing diagnostic criteria are mostly based on male symptomatology and have a higher chance of misdiagnosing female patients. There is a need to understand female symptomatology of ASD so that female oriented ASD assessment tools can be devised.

Objectives:

To identify the difference in clinical phenotypes between female and male children with Autism Spectrum Disorder.

Methods:

31 girls with ASD (median age-58 months) age-matched with 31 boys with ASD (median age-60 months) were enrolled for the study. Developmental assessment/ Intellectual Quotient of the enrolled subjects was done using Developmental Profile-3 for children upto 12 years of age and Binet Kamat Test for children older than 12 years. The median IQ/DQ of girls was 54 (44-69.5) and that of boys was 60 (43.75-71.5). Childhood Autism Rating Scale-2 (CARS-2), Child Behaviour Checklist (CBCL), Social Responsiveness Scale-2 (SRS-2), Vineland Adaptive Behavioural Scale-2(VABS-2) and Repetitive Behaviour Questionnaire-2 (RBQ 2) were used for comprehensive assessment of symptoms.

Results:

The mean CARS-2 score, though higher in females, was statistically not significant (Mean 37.4 ;SD 4.79 in females vs mean 36.60; SD 6.75 in males). The SRS-2 total score was also found to be higher in females (Females: 76.29 ± 10.66 ; Males: 75.03 ± 11.34). The SRS-2 Social Communication Index score was 74.87 ± 11.30 in females and 75.48 ± 12.34 in males. However, the SRS-2 RRB score was significantly higher in females (Females: 75.52 ± 9.48; Males: 70.13 ± 9.95; p=0.033), which probably contributed to higher SRS-2 total scores in females. The RBQ-2 also showed significantly higher RRBs in females [32 (29.5-35)] versus males [ 29 (27-32)], p=0.041. There was significant difference between female and male ASD patients in terms of CBCL Internalising score (p=0.002) and Total score (p=0.022) with females scoring higher in each domain. The VABS-2 showed a significant difference between the 2 groups in Daily Living Skills Domain standard score (p 0.049), with the mean being higher in males suggesting better daily living skills in males.

Conclusions:
This study affirms that girls with ASD have different symptom expression as compared to boys. No significant difference was found between the two groups in severity of ASD even though the scores were higher in females. The females were also found to have significantly higher RRBs than males. Our findings of higher CARS-2 scores and higher RRBs in girls are contrary to existing literature. As the study was conducted immediately post-COVID, females exhibiting severe symptoms may have attended the hospital. Further studies with significant sample size are required for comprehensive understanding of female ASD symptoms.

422.129 (Poster) Early Screening for Autism Spectrum Disorder in Tunisian Toddlers

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Background:

In Tunisia, the last prevalence study of ASD was in 2009 and did found a prevalence of 0.3%. However, in our daily practice we observe a rise in the number of children diagnosed with the disorder. Is it an awareness of the diagnosis or a real increase in prevalence?

Objectives:

Early screening of Tunisian infants for ASD.

Determine the prevalence of ASD in a general population sample.

Methods:

A cross-sectional community-based study, conducted during the first semester of 2022. We included the first 1000 toddlers coming for the 18 months’ obligatory vaccines. The final number of participants was 918 with 82 questionnaires not interpretable. We enrolled the study population in the different primary care structures in the East central region of Tunisia. We used an Arabic validated version of the Modified Checklist for Autism in Toddlers (M–CHAT) for first screening, then the M–CHAT Follow-Up Interview for the positive ones. Children with pathological scores were referred for evaluation using the Autism Diagnostic Interview revised (ADI-R).

Results:

In 177 (19.3%) of cases, the M-CHAT was positive. In the second screening using the M-CHAT Follow-up, only twenty was positive for possible ASD. From this 20: nine had a confirmed diagnosis of ASD using the ADI-R, one had a global developmental delay, one had hearing impairment, Reactive attachment disorder was confirmed for one child, one had language disorder, three had no developmental problems and three were absent for their schedules. This screening led us to a prevalence of ASD reaching 1% with a confidence interval at 95% of [0.35-1.65]

Conclusions:

The prevalence of ASD in Tunisia meets international estimates. Using a double screening tools could be a cost-effective strategy of detection. The mandatory vaccine system in Tunisia is a helpful way to be the most exhaustive in screening campaigns.

422.130 (Poster) Effects of Insurance Status and Child Sex on Clinical Characteristics of Autism Spectrum Disorder

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Background: The global mean age for autism spectrum disorder (ASD) diagnosis in young children is 43.18 months (Hof et al., 2020), and research supports autism is more commonly diagnosed in males than females with a 3:1 ratio (Loomes et al., 2017). Although a strong male bias has been consistently observed, diagnosis of ASD is impacted by many factors (e.g., symptom severity, provider shortage, physician knowledge, insurance coverage, family awareness, language, and stigma; Malik-Soni et al., 2021). To determine barriers that limit access to diagnostic evaluations and best meet patient and family needs, it is imperative to continue analyzing factors that facilitate and impede diagnosing autism in young children.

Objectives: Examining the effects of socioeconomic status (SES), sex, and SES by sex interaction on ASD diagnosis in a clinical sample of young children.
Evaluating Causal Associations between Maternal Health Conditions and Autism in Offspring Using a Two-Sample Mendelian Randomization Approach

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Background:

Several case-control and cohort studies have reported associations between health conditions experienced by mothers during pregnancy and increased odds of autism in children. Despite consistent findings from observational studies, these associations may still be explained in part by unmeasured or residual confounders. For example, few studies included sibling controls to account for familial confounding. Mendelian randomization is a tool for estimating causal effects of potentially modifiable environmental exposures from observational data by using genetic risks as instrumental variables to account for potential confounding.

Objectives:

Estimate causal effects of maternal body mass index (BMI), type 2 diabetes (T2D), and asthma on autism in offspring using two-sample Mendelian randomization (2SMR) approaches.

Methods:

Summary statistics for independent single nucleotide polymorphisms (SNPs) were used from genome-wide association studies (GWAS) of BMI (N=322,154 individuals; GIANT Consortium), T2D (N= 9,978 cases/13,348 controls; EPIC-InteractAct Cohort) and asthma (N=10,549 cases/47,146 controls; UK Biobank Cohort). Effect alleles and directions were harmonized with autism GWAS summary statistics (N= 18,381 cases/27,969 controls; iPSYCH-PGC), and overlapping SNPs used as multiple genetic instruments for 2SMR. Instrument strength was evaluated using F-statistics for individual SNPs and averaged across all SNPs for each condition. Causal effects of maternal conditions on autism were estimated using the inverse-variance weighted (IVW) method and sensitivity analyses were performed for outlying SNPs and pleiotropic effects using weighted median and MR-Egger, respectively.

Results:

A total of 95 SNP instruments were used in 2SMR for BMI, 200 SNPs for T2D and 58 SNPs for asthma. The mean instrument strengths (F-statistics) for BMI, T2D and asthma were 57, 55 and 31, respectively and for all SNPs were above the empirical cut-off of 10 (minimum= 16). Estimates from IVW analyses did not support causal effects of any of the three exposures on autism (BMI: OR (per 1 SD

Conclusions: In young children diagnosed with ASD, insurance status (i.e., Medicaid eligibility) had a main effect on the severity of clinical characteristics and levels of support assigned at diagnosis. Outcomes did not support sex impacting severity of symptoms or diagnosis in a tertiary care setting. Findings do support insurance status facilitated access to diagnosis at an early age given the clinic prioritized providing evaluations for young patients with Medicaid.
Background: Electronic healthcare record (EHR) data presents a unique opportunity for autism researchers to look at large, diverse samples of autistic individuals across an entire healthcare system. For example, EHR data allows us to test whether reported proportions about the presentation of autism are reflected in real-world clinical practice. One commonly reported statistic is that the rate of girls diagnosed with autism is approximately 20% (or a 4 to 1 ratio of boys to girls). A variety of factors, such as male bias in interpreting clinical presentation and core symptom variability, have been cited as contributing to missed or delayed diagnosis in girls. Sex differences in diagnoses are not exclusive to autism, as research shows a similar sex ratio of 3 to 1 for boys to girls diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD). Given the high co-occurrence rate (30-50%) of ADHD among individuals on the autism spectrum, additional analysis is needed to understand the interplay of sex ratios and autism/ADHD co-occurrence at different ages. Leveraging the advantages of EHR datasets, we can begin to look at these sex proportions from childhood to early adulthood in autistic individuals with and without ADHD.

Objectives: Aim 1: Determine if the proportion of girls identified as having autism changes over different ages. Aim 2: Test whether a subset group of children with co-occurring autism and ADHD follows a similar prevalence rate to the general population rates of ADHD and if the sex differences within the group also change over time.

Methods: Participants included de-identified data of 9,162 autistic children and young adults ages 2-21 years that were pulled from the Children’s Hospital of Philadelphia Electronic Healthcare Database up to 2019. After grouping participants by age in years, we examined the proportion of autistic girls relative to the total of children at each age. Our two largest races represented were white (49.5%) and Black/African American (31.2%) participants.

Results: The proportion of autistic girls within our system was exactly as expected – 20%. The number of participants within each age group ranged from 159 (at age 2) to 579 (at age 8). Contrary to our predictions, the proportion of girls diagnosed with autism remained stable over age (Figure 1) with the highest proportion of girls diagnosed at 2 years of age (25.6%) and the lowest proportion is at 7 years (18%—a difference of 7%).

Conclusions: These results show that despite literature indicating that girls are diagnosed with Autism Spectrum Disorder later in life than boys, the proportion of girls identified as autistic does not change over age in a large pediatric sample. Ongoing analysis will reveal whether the proportion of autistic girls with co-occurring ADHD is different from the reported 3 to 1 ratio in the ADHD population as well as if the subsample of individuals diagnosed with autism and ADHD follows similar sex ratios over age. Analyzing large population samples, made possible through novel EHR research, can help illuminate population trends that might not be apparent in smaller cohort studies.
Background:

The SPARK study was launched in 2016 to recruit and retain a cohort of individuals with autism and their family members across the United States. In order to recruit the now over 300,000 participants, SPARK has adopted a multimodal approach that includes the use of traditional and social media, partnerships with community organizations and support of a network of clinical sites throughout the US. Participants who affiliate with a clinical site may be provided additional support to complete enrollment and core study tasks.

Objectives:

To describe the major recruitment strategies for SPARK and to evaluate their relative effectiveness with respect to enrollment and core task completion.

Methods:

This study includes “primary account holders,” defined as the individuals who first join SPARK on behalf of their families and are assigned the majority of study tasks, who joined between January 31, 2018 to May 29, 2019. Data collected and utilized in the analyses include self-reported sociodemographic characteristics, clinical site affiliation (Y/N), how the participant heard about SPARK, the website URL used to join, enrollment completion (online registration and returning saliva kit; Y/N) and core task completion (completion of initial participant dashboard questionnaires; Y/N). Bivariate and multivariable logistic regression analyses were performed to evaluate the odds of enrollment and core task completion by recruitment method.

Results:

33,855 individuals joined SPARK during the study period. Forty one percent were recruited through or affiliated with a clinical site. A clinical site (40%) or online (38%) were the most common ways a participant heard about SPARK. Of participants with available URL data (77%), the top websites used to join the study were Facebook or Instagram (48%), the SPARK website (17%), Google or other search engines (15%), and SPARK clinical site URLs (14%). A total of 87% completed online registration (i.e., consented to both data and genetic portions of SPARK), and 45% completed enrollment including (online registration and returning saliva kit). Participants affiliated with a clinical site had ~3 fold higher odds of completing enrollment compared to those not affiliated with a clinical site (unadjusted OR: 2.79, 95% CI 2.67 - 2.92; adjusted OR: 2.98, 2.98 OR, 95% CI 2.69 - 3.31). With respect to how participants heard about SPARK, compared to clinical sites, participants referred through online and media announcements were significantly less likely to complete enrollment. In terms of the distinct URL used to join, participants were almost 7.5 times more likely to complete enrollment if it was directly through directly the SPARK website (i.e. www.SPARKforAutism.org/UCLA) as compared to coming from a Facebook or Instagram post or advertisement. The same relationships were observed for core task completion.

Conclusions:

For many SPARK participants, their increased likelihood of completing enrollment and study tasks may be attributable to the “personal” connection provided through affiliation with a clinical site and/or support provided by the study coordinators. Findings from this study underscore the value of adopting a multimodal recruitment approach that combines widespread national social media advertising and focused recruitment strategies through clinical sites.

422.134 (Poster) Factors Related to Earlier Autism Spectrum Disorder Diagnosis in New Jersey
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Background: Early diagnosis and intervention of Autism Spectrum Disorder (ASD) has been identified as a public health priority [1]. Yet, the median age of ASD diagnosis has hovered around 52 months from 2000-2016 in the United States and New Jersey [2,3]. Since ASD can be reliably diagnosed by 24 months, there is significant room for improvement in early identification [4]. To promote equal access to beneficial early intervention programs, it is critical to investigate how sociodemographic and clinical factors may affect ASD diagnosis age.

Objectives: The objective of this study is to describe how birth year, sociodemographic and clinical factors are related to age of ASD diagnosis in New Jersey.

Methods: Seven consecutive New Jersey Autism Study surveillance cycles from 2000-2016 contributed data. Each cycle reflected a cohort of 8-year-old children residing in Hudson, Ocean, Union and Essex counties. Data regarding sex, race, socioeconomic status (SES), birth year, intellectual ability, developmental delay status and ASD severity were all obtained from the children’s health and educational records. The outcomes were community provider ASD diagnosis by 36 and 48-months. Pearson Chi-square evaluated differences between children diagnosed by 36 and 48-months. Crude and adjusted models were estimated to examine sociodemographic and clinical factors associated with ASD diagnosis by 36 and 48 months.
Results: Of the 4,661 ASD cases identified through active surveillance from 2000 to 2016, analysis was restricted to 3,450 (82% male) children with an existing ASD diagnosis from a community provider by 8-years of age. The sample was racially diverse, comprised of mainly minority children. There were no differences in proportion of males and females diagnosed by 36 (p=0.42) or 48 months (p=0.74). County differences in diagnosis by 36 (p=0.05) and 48 months (p=0.001) were observed. Differences by race and birth year were observed at 36 months (p<0.05), but not at 48 months. After adjusting for birth year, sociodemographic, and clinical factors, non-Hispanic Black (NHB) children had lower odds of diagnosis by 36 months than non-Hispanic White (NHW) children (AOR = 0.8; 95% CI: 0.6-1.0). Children residing in high-income areas had higher odds of diagnosis by 36 months (AOR = 2.1; 95% CI: 1.7-2.6) and 48 months (AOR: 1.8; 95%CI: 1.5-2.2) than children from low-income areas. Across all models, the odds of diagnosis by 36 months were greater in more recent study years. Finally, presence of a co-occurring intellectual disability, presence of developmental delays and more severe ASD each independently increased the odds of ASD diagnosis by 36 and 48 months.

Conclusions: The greater proportion of children diagnosed with ASD by 36 months represents improvement of the ASD diagnostic system in our region. This demonstrates progress, since the first few years of life are particularly important for the development of children with ASD [5]. We observed NHB children and children from low-SES were vulnerable to delayed ASD diagnosis. We recommend the usage of a universal ASD screener to promote earlier identification and reduce disparities in ASD diagnosis age.

422.135 (Poster) Fecal Microbiota Transplantation from Autistic Children Modulates Behavior, Intestinal Parameters and Inflammation in BALB/c Mice
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Background: Increasing evidence highlights the involvement of the microbiota-gut-brain axis in autism spectrum disorder (ASD). Gastrointestinal (GI) deficits and gut microbiota dysbiosis have been suggested to contribute to the development or severity of ASD.

Objectives: To validate the role of the gut microbiota in autism and investigate mechanisms though which they interact with the gut and brain, we transplanted BALBc mice with stools of children diagnosed with ASD without and with gastrointestinal (GI) symptoms or their siblings as controls.

Methods: Stool samples of n=4 children diagnosed with ASD (A, all male 6-8 yrs.), sibling controls (S-A, 3 male, 1 female 3-14 yrs), ASD with GI problems (AG, all male 7-10 yrs) and sibling controls (S-AG, 2 male and 2 females 3-13 yrs) were collected and pooled for transplantation into mice. Conventional colonized male BALB/c (3-4 wks, n=6 per group), that were depleted by bowel cleansing using polyethylene glycol (PEG), were transplanted with AG or S-AG stools for three consecutive days by gavage (200μl, hFMT). Germ free male BALB/c (GF, 3-4 wks, n=9-13 per group) were transplanted with A, S-A, AG or S-AG stools in a similar way. Behavioral and cognitive tests were performed (9-11 wks). In addition, microbiota composition & activity, intestinal phenotype, systemic inflammation and neuroinflammation in the brain after sacrificing at wk 12.

Results:

In PEG-microbiota depleted BALB/c mice, hFMT with AG stools decreased exploratory behavior compared to S-AG. AG hFMT induced low-grade intestinal inflammation with a reduction in enteric glial cells, low-grade systemic inflammation and neuroinflammation in the brain in recipient mice when compared to control transplanted mice. Metabolomics showed altered tryptophan metabolism in hFMT AG transplanted mice. Moreover, hFMT with AG, but not sibling control stools, resulted in increased intestinal barrier permeability, which was associated with lower soluble IgA response. Fecal short chain fatty acids (SCFA, acetate) and branched & long chain fatty acid levels were significantly enhanced in stool samples of hFMT AG compared to S-AG transplanted mice.

In GF BALB/c mice, hFMT with A or AG stools did not induced difference in behavior or neuroinflammation in the brain compared to respective sibling control transplanted mice. In both A and AG hFMT GF mice decreased number of serotonergic neurons in the ileum and raphe nuclei was observed. 6 Wks after hFMT, a significant increase in fecal alpha diversity was found in AG, but not in A, compared to sibling control stool transplanted GF mice. hFMT with A and AG stools induced significant differences of beta diversity when compared to respective sibling controls, which was associated with different SCFA profiles.

Conclusions: Overall, our findings enlighten the alterations in the intestinal microbiota and physiology, the immune system and behavior of mice transplanted with A or AG stools and provide evidence for hFMT as a promising tool to study ASD pathophysiology, specifically the microbiota-gut-immune system-brain axis, or the potential effects of treatments.

422.136 (Poster) Frequency of Fruits and Vegetables Consumption and Their Possible Interactions with Genotypes of Glutathione S-Transferase Genes in Relation to ASD and ASD Severity in Jamaican Children
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Aims: To explore the frequency of Fruits and Vegetables Consumption and their possible interactions with genotypes of Glutathione S-transferase (GST) genes in Jamaican children with ASD.

Methods: A total of 538 Jamaican children (312 ASD and 226 Control) aged 4-17 years were included in this study. The frequency of Fruits and Vegetables Consumption was measured using a structured food frequency questionnaire. The genotypes of GST genes were determined using polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP). The associations between Fruits and Vegetables Consumption and genotypes of GST genes were assessed using logistic regression analysis.

Results: The frequency of Fruits and Vegetables Consumption was significantly lower in children with ASD compared to controls (p<0.05). Moreover, certain genotypes of GST genes were associated with reduced Fruits and Vegetables Consumption in children with ASD.

Conclusions: The lower frequency of Fruits and Vegetables Consumption in children with ASD may be attributed to their genotype. Further studies are needed to confirm these findings and to explore the possible role of GST genes in the development of ASD.
Background: Atypical selective eating, with reduced preference for fruits and vegetables (FVs), is common in children with Autism Spectrum Disorder (ASD). These children are prone to deficiency of phytonutrients with antioxidant effects. Polymorphisms in glutathione S-transferase (GST) genes can also influence susceptibility to increased oxidative stress, a possible underlying mechanism for ASD.

Objectives: To investigate associations of the frequency of FV consumption, and its interactions with GST genes, in relation to ASD and ASD severity in Jamaican children.

Methods: Using Exploratory Factor Analysis, we identified seven groups of FVs. Factor scores were calculated by summing reported weekly basis intakes of the factor food items and analyzed as scores: ≥ 3rd quartile vs. < 3rd quartile representing high vs. low consumption. Using data from 242 pairs of age-(± 6 months) and sex-matched ASD cases and typically developing (TD) controls (n=484), we assessed additive and interactive associations of the frequency of FV consumption with polymorphisms in three GST genes (GSTM1, GSTP1 and GSTT1) in relation to ASD, using conditional logistic regression models. With data from (n=242) ASD cases, we used General Linear Models to assess the association of the frequency of FV consumption, and its possible interaction with the GST genes in relation to ASD severity as measured by the Autism Diagnostic Observation Schedule-Second Edition (ADOS-2) standardized total, as well as the Social Affect (SA) and Restricted and Repetitive Behaviors (RRB) domains specific comparison scores (CSs).

Results: After adjusting for child’s age and socioeconomic status, ASD cases consumed significantly fewer servings of all groups of FV than TD controls (all matched odds ratios ranging from 0.14 to 0.64, and all P ≤ 0.02). Among ASD cases, high consumption of fruits high in unsaturated fatty acids, legumes and unpeeled fruits was associated with less severe social and/or behavioral signs of ASD (all P ≤ 0.03). Additionally, the presence of at least one Val allele for GSTP1 was associated with consuming fewer servings of fruits high in unsaturated fatty acids, vitamin C and beta-carotene, antioxidants, and fruits and/or vegetable juice by ASD cases than TD controls (all P ≤ 0.01, and P for interaction ≤ 0.02). GSTT1 and GSTM1 1/1 or 1/D genotypes were also associated with consuming fewer servings of legumes and any types of unpeeled fruits by ASD cases than TD controls (P for interaction = 0.02 and 0.03, respectively). Furthermore, high versus low frequency of legumes and juices was associated with significantly lower ADOS-2 SA CS only among ASD cases homozygous for GSTP1 Ile105 (P = 0.01 and 0.03, respectively; P for interaction ≤ 0.04). Similarly, high consumption of fruits high in antioxidants had an inverse association with ADOS-2 RRB CS only among ASD cases with GSTP1 Ile/Ile genotype (P ≤ 0.01; P for interaction ≤ 0.03).

Conclusions: Our findings suggest the frequency of fruits and vegetables consumption is associated with ASD and ASD severity, and the genotype for GST genes may have a modifying role on these associations in Jamaican children, though they require replication in other populations.

422.137 (Poster) Genome, Environment, Microbiome and Metabolome in Autism (GEMMA) Study Design: Biomarkers Identification for Precision Treatment and Primary Intervention of Autism Spectrum Disorders By an Integrated Multi-Omics Systems Biological Approach

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Background: Increasing evidence is highlighting that the intestinal microbiota participates in the gut-brain axis playing a key role in Autism Spectrum Disorder (ASD). The GEMMA project (Genome, Environment, Microbiome and Metabolome in Autism) is a study that focuses on the role of the gut-brain axis in ASD by in-depth evaluation and observation of newborns who have a family history of ASD (i.e. siblings of children with ASD). The consortium consists of 16 partners from leading research institutions across Europe and the US.

Objectives: GEMMA aims to identify potential biomarkers which may pave the way for early diagnosis and personalized therapeutic support of ASD, followed by validation on large multi-omics datasets. The study will provide mechanistic evidence of the condition onset and progression in relation to dynamic changes in abnormal gut microorganisms causing epigenetic modifications controlling gut barrier and immune function.

Methods: Italy, Ireland, and the US are enrolling 600 infants for an in-depth evaluation through sample collection (stool, blood, saliva, and urine) and ASD evaluations. For the observational trial, Biospecimens are being collected from birth and every 6 months from infants up until 36 months of age. Enrolled infants are observed from birth and followed over time for early interception of clinical manifestation of ASD and associated microbial and molecular biomarkers detected by omics analyses. The project also includes an interventional arm (to
Germline Aging in Sperm Is Associated with Quantitative Autistic Traits in an Autism-Enriched Cohort

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Background: Advanced paternal age is among the prevailing hypotheses for paternal contributions to autism in children. This is due in part to increased rates of DNA mutations and fragmentation in sperm, and decreased efficacy of DNA proofreading and repair enzymes. However, how other biological indicators of aging that are detectable in sperm — such as epigenetic germline age — are associated with autism or autistic traits has not been assessed. This is important, given that the faithful transfer of gametic genetic and epigenetic information to the developing fetus is essential for neurodevelopment. Recently, a model was developed that uses the sperm DNA methylome to predict an individual’s germline age. This can serve as a biomarker for germline aging and allow for the investigation of how deviations from one’s chronological age might be associated with autistic traits in children.

Objectives: Given that advanced paternal age is associated with autism likelihood in children, we hypothesized that accelerated germline age, relative to chronological age, is associated with quantitative autistic traits in three-year-old children from an autism-enriched cohort.

Methods: This work was conducted in the Early Autism Risk Longitudinal Investigation (EARLI) – a prospective pregnancy cohort that enrolled pregnant people with a child diagnosed with autism. Autistic traits were measured by 1) the Social Responsiveness Scale (SRS), a 65-item questionnaire measuring social communication deficits; 2) the Vineland Adaptive Behavior Scale (VABS), a semi-structured interview that assesses adaptive functioning across multiple domains; and 3) the Mullens Scale for Early Learning (MSEL) that measures cognitive functioning. Sperm was collected from fathers around the time of conception and DNA methylation was analyzed on the Infinium HumanMethylation450 BeadChip platform. We computed estimated germline age (years) using the Jenkins clock, and accelerated epigenetic age was defined as the positive residual obtained from regressing chronologic age on germline age. Generalized linear models adjusting for child sex, paternal education, and genetic ancestry principal components were run to determine how germline age associated with composite and subscale scores for SRS (n=29), VABS (n=33), and MSEL (n=32).

Results: After adjusting for confounders, we demonstrated that accelerated germline age was associated with deficits in social communication for SRS composite scores (β=3.88, p = 0.04, for a one-unit increase) as well as deficits in the cognition (β=0.93, p = 0.01) and communication (β=1.42, p = 0.04) subscales. Decelerated germline age was associated with increased adaptive functioning for VABS composite (β=−2.42, p = 0.007, for a one-unit decrease) and subscale scores across the communication (β=−1.43 p = 0.03), daily living (β=−1.11, p = 0.02), and socialization (β=−1.23, p = 0.01) domains. We did not observe any significant associations between germline age and MSEL composite or subscale scores, though the direction of the relationship between germline aging and trait-outcomes was consistent with observations for SRS and VABS.
Conclusions: We demonstrate that accelerated paternal germline aging is associated with deficits in social communication and adaptive functioning in children from an autism-enriched cohort. These findings provide further support for the role of non-genetic paternal contributions to autism liability.

422.139 (Poster) Head Circumference Trajectories in Autism and Psychotic Experiences
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Background: Autism spectrum disorder (ASD) and schizophrenia are both considered to be neurodevelopmental disorders, and research indicates several similarities between the two conditions including negative symptomatology, genetics, and brain structure alterations (Patel et al., 2020; Stone & Iguchi, 2011) However, early brain overgrowth is frequently cited in ASD, while psychotic disorders, which have a later onset, are more commonly associated with attenuated volumes. Head circumference, which can be used as a proxy measure for brain development, may offer insights into the neurobiological trajectories in these two disorders.

Objectives: To compare head circumference trajectories in those with 1) ASD, 2) psychotic experiences (PE), to 3) neurotypical controls, in the Avon Longitudinal Study of Parents and Children (ALSPAC).

Methods: Head circumference measurements were collected in the ALSPAC birth cohort at birth, 7 years and 15.5 years in over 3000 participants. Parents confirmed their child’s ASD status using a questionnaire at age 9 years. Psychotic experiences were assessed using the Psychosis Like Experiences Semi-Structured Interview (PLIKSi) at age 18 years. Participants with PE’s were subdivided into the following groups: suspected PE, definite PE, and psychotic disorder. Analyses of variance were conducted for each timepoint cross-sectionally, with multi-level modelling of repeated measures currently underway to assess longitudinal trajectories (additional timepoints to be included).

Results: Autism was associated with significantly larger head circumference compared to controls at birth (F(1:5927) = 4.6, p = 0.03) with a similar trend at age 7 years (F(1:6275) = 3.45, p = 0.06). There was no difference between the ASD and control groups at age 15.5 (p = 0.26). In contrast, psychotic experiences were associated with a trend towards reduced head circumference at birth (F(3:3572) = 2.55, p = 0.054) and a significant reduction at age 7 compared to controls (F(3:4020) = 3.99, p = 0.008). Post-hoc tests revealed smaller head circumferences in the psychotic disorder group compared to controls (p <0.01). There was no difference between PE and control groups at age 15.5. Preliminary longitudinal analyses suggest that head circumference is increased in ASD (p = 0.006) with no difference over time (no interaction between diagnosis and age (p = 0.91)).

Conclusions: Differences in childhood head circumference in both ASD and PE compared to neurotypical controls indicates the presence of atypical neurodevelopment. The finding of divergent trajectories across the two disorders suggests that head circumference may act as an early biomarker to distinguish autism from psychotic experiences.

422.140 (Poster) Hospitalizations of Autistic Individuals in the United Kingdom during the Covid-19 Pandemic
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Background: Autistic people have increased rates of physical and mental health conditions compared to non-autistic people. Prior research indicates significant overlap between those conditions which pose increased risk for a serious illness due to Covid-19 and conditions that frequently co-occur with autism (National Health Service, 2021; Croen et al., 2015; Davignon et al., 2018; Hand et al., 2020; Weir et al., 2021; Weir et al., 2022). Specifically, autistic individuals have elevated likelihood for immune disorders, diabetes, obesity, and respiratory, cardiovascular, mental health, and neurological conditions as compared to non-autistic individuals (Croen et al., 2015; Davignon et al., 2018; Hand et al., 2020; Weir et al., 2021; Weir et al., 2022). Data on substance misuse and immune dysregulation were less consistent (Croen et al., 2015; Vohra et al., 2017; Butwicka et al., 2017; Davignon et al., 2018). Overall, these co-occurring health conditions could result in more severe Covid-19 outcomes for autistic people compared to non-autistic people.

Objectives:

This study investigated whether autistic people were overrepresented in the population of individuals hospitalized during the Covid-19 pandemic. The two specific outcomes that were investigated were risk of all-cause hospitalizations and risk of Covid-19 associated hospitalizations.

Methods:
Data were drawn from the clinical practice research database. All-cause and Covid-19 associated hospitalization hazards ratios were calculated using Cox regression for 46,194 patients (N = 15,398 autistic patients) and 46,956 patients (N = 15,652 autistic patients) respectively. Patients were matched on age (± 2 years), sex, and GP practice. Sex, indices of multiple deprivation (a measure of SES in which lower levels indicate greater deprivation), age, GP practice, obesity, smoking, and alcohol misuse were entered into the models as covariates.

Results:

Table 1 shows elevated risk for all-cause hospitalization during the Covid-19 pandemic among autistic individuals who did not misuse alcohol as compared to controls of similar demographics (AHR: 1.33, 95% CI: 1.24–1.42, p < 0.001 with FDR adjustment). Males had significantly less risk of all-cause hospitalizations than females (AHR: 0.52, 95% CI: 0.49–0.56, p < 0.001 with FDR adjustment). Alcohol misusers were excluded in order to satisfy proportional hazard assumptions.

Table 2 shows that autistic people had significantly greater risk for Covid-19 related hospitalizations compared to controls (AHR: 1.90, 95% CI: 1.25–2.89, p < 0.01 with FDR adjustment). Males again had significantly less risk than females (AHR = 0.49, 95% CI: 0.32–0.75, p < 0.001 with FDR adjustment). Individuals in the lowest deprivation level had greater risk than individuals in the second lowest quartile, shown by the AHR less than one for IMD level 2 (AHR: 0.41, 95% CI: 0.20–0.83, p = 0.01).

Conclusions:

These results indicate that autistic people have increased risk for hospitalizations, and especially heightened risk for Covid-19 associated hospitalizations. For all-cause hospitalization risk specifically, alcohol misusers were excluded from the all-cause hospitalization cox analysis to satisfy cox proportional hazards assumptions, so no conclusions can be drawn about smokers. These data indicate that autistic individuals may have heightened risk for serious illness as a result of Covid-19.

422.141 (Poster) Sex Differences in Autism Symptom Severity Change across Childhood

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Background: Autism symptoms are comprised of social-communication deficits and restricted/repetitive behaviors (RRB). The severity of these symptoms can change during childhood, with differences between boys and girls. We have previously found that young autistic girls show a stronger tendency to decrease and a weaker tendency to increase in their overall autism symptom severity levels compared to young autistic boys (Waizbard-Bartov et al., 2020; 2022). It is not clear, however, which symptoms are driving these sex differences across childhood.

Objectives: In the current study we evaluated the trajectories of independent autism symptoms across childhood and compared patterns of change (increase or decrease in severity) and stability in such symptoms between boys and girls.

Methods: The study included 183 children diagnosed with autism (55 girls) evaluated three times across childhood, at ages 3, 6 and 11. We analyzed 24 independent items from the Autism Diagnostic Observation Schedule-2 (ADOS-2), the gold-standard assessment tool for autism symptoms, each item representing a specific autism symptom. We used latent growth curve (LGC) models to estimate the trajectories for the 24 ADOS-2 items across childhood, for boys and girls separately. We characterized these trajectories in terms of an initial symptom severity level (i.e., intercept), change across childhood (i.e., slope) and the association between the two (i.e., covariance of intercept and slope) for boys and girls.

Results: Fifteen of 24 items evaluated showed significantly changing trajectories across childhood, 13 of these decreasing-severity trajectories, for boys, girls or both. Both sexes had decreasing trajectories for several social-communication symptoms including “overall level of language”, “conversation”, “response to name”, “unusual eye contact”, “facial expressions” and “gestures”. Only girls had a decreasing trajectory for the “response to joint attention” item and only boys had a decreasing trajectory for the “quality of social o Ivets” item. For RRB, both boys and girls had a decreasing trajectory for “echolalia”. Boys also had decreasing trajectories for the “mannerisms” and “speech abnormalities” items, whereas the slopes of these items for the girls did not reach significance (i.e., considered stable). While only decreasing and stable trajectories were identified for girls, boys had two significantly increasing-severity trajectories, for the “shared enjoyment” and “stereotypic, idiosyncratic speech” items. Both boys and girls showed decreasing trajectories for “creative, imaginative play”. Boys also had a decreasing trajectory for “functional play”, whereas for girls, this did not reach significance. For all other items, the estimated slopes were not statistically significant and, thus, deemed to indicate stable severity levels across childhood.
Conclusions: Girls and boys showed similarities and differences in the in the changes of autism symptom severity across childhood. Both sexes tended to decrease in the severity of several social-communication symptoms, while other symptoms remained stable. Boys had a stronger tendency to decrease in severity of RRB than girls. But, while girls showed only decreasing-severity and stable trajectories, boys also had increasing-severity trajectories for some of the symptoms.

422.142 (Poster) Evaluating Sex Differences in Change Patterns of Autism Symptom Severity across Childhood

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Background: Autism symptoms are comprised of social-communication deficits and restricted/repetitive behaviors (RRB). The severity of these symptoms can change during childhood, with differences between boys and girls. We have previously found that young autistic girls show a stronger tendency to decrease and a weaker tendency to increase in their overall autism symptom severity levels compared to young autistic boys (Waizbard-Bartov et al., 2020, 2022). It is not clear, however, which symptoms are driving these sex differences across childhood.

Objectives: In the current study we evaluated the trajectories of independent autism symptoms across childhood and compared the patterns of change in such symptoms between boys and girls.

Methods: The study included 183 children diagnosed with autism (55 girls) evaluated three times across childhood, at ages 3, 6 and 11. We analyzed 22 independent items from the Autism Diagnostic Observation Schedule-2 (ADOS-2), the gold-standard assessment tool for autism symptoms, each item representing a specific autism symptom. First, we used latent growth curve models to estimate the trajectories for the 22 ADOS-2 items for each child in the study. Second, we extracted the factor scores representing the individual slopes for each ADOS-2 item (i.e., slope representing that child’s change in that specific item). Third, we used factor analysis to identify common patterns of change among the ADOS-2 items, separately for boys and girls, i.e., which autism symptoms tend to change together and which change independently across childhood.

Results: The best emerging patterns for both boys and girls identified four common factors: three factors representative of changes in social-communication symptoms and one factor describing changes in RRB. Boys and girls showed the same pattern of change in RRB, with four items (e.g., speech abnormalities) changing together across childhood and three items (e.g., mannerisms) changing independently of other items. For social-communication deficits in boys, three factors were identified: the first factor included six items representing initiating and engaging in social-communication (e.g., quality of social otures, conversation), the second factor included five items describing responsive social-communication (e.g., response to name) and the third factor included three items related to different aspects of social-communication (e.g., level of language). Girls’ social-communication deficits also loaded onto three factors: the first factor included five items (e.g., unusual eye contact), the second factor included six items (e.g., quality of social response) and the third factor included four items (e.g., showing). Some items showed similar patterns of change for both sexes (e.g., responsive joint attention), while other items showed differences (e.g., shared enjoyment).

Conclusions: Girls and boys had different patterns of change in autism symptom severity across childhood. For RRB, both sexes showed similar patterns. For social-communication symptoms, however, there were both similarities and differences between boys and girls in the way symptoms changed over time. The strongest patterns of change were identified for initiating and engaging in social-communication for girls.

422.143 (Poster) Prenatal Exposures to Endocrine-Disrupting Chemicals and Autism-Related Outcomes in Childhood

Background: Many endocrine-disrupting chemicals (EDCs) have neurotoxic potential, but their influence on autism spectrum disorder (ASD) remains to be elucidated. Per- and polyfluoroalkyl substances (PFAS) and organophosphate esters (OPEs) are two classes of EDCs that are widely detected in the U.S. population, including pregnant people, due to their ubiquitous use in industry, manufacturing, and consumer products. To date, the epidemiological evidence linking prenatal exposure to these EDCs with altered neurodevelopment is inconclusive, and few large studies have focused on autism-related outcomes.

Objectives: This study investigates whether concentrations of PFAS and OPEs in biospecimens collected during mid-pregnancy are associated with child autism-related outcomes.

Methods: Twenty cohorts from the National Institutes of Health (NIH)-funded Environmental influences on Child Health Outcomes (ECHO) Program were included. Fourteen PFAS were measured in maternal serum/plasma samples from 10 cohorts (n=1,429) and nine OPE analytes were measured in maternal urine samples from 19 cohorts (n~7,000). We assessed dimensional autism-related behaviors in children via parent report on the 65-item Social Responsiveness Scale (SRS). We also obtained information on clinical diagnosis of ASD from either parental report or abstraction of medical records. We examined relations of individual PFAS and OPE analytes with SRS scores in multivariable linear models and with child ASD diagnosis in multivariable logistic models. All models were adjusted for potential confounders including maternal age at delivery, maternal educational attainment, maternal race/ethnicity, parity, and child sex. EDC levels were modeled continuously, categorically, or as detect/non-detect depending on the proportion of participants with values above the limit of detection. We further modeled each EDC class as a mixture using Bayesian methods in order to evaluate the aggregate and relative contributions of each EDC within each class. We examined modification of these relations by child sex.

Results: Concentrations of most PFAS were not associated with child SRS T-scores. Perfluorononanoic acid (PFNA) showed the strongest and most consistent association: each ln-unit increase in PFNA was associated with greater autism-related traits (adj-β:1.5, 95% CI: -0.1, 3.0). PFNA showed a stronger association with scores on the SRS subscale of social communication and interaction (adj-β:1.8, 95% CI: 0.2, 3.4) relative to the subscale of restricted interests and repetitive behaviors (adj-β: 1.1, 95% CI: -0.6, 2.8). The summed mixture, which included 6 PFAS detected in >70% of participants, was not associated with SRS T-scores (adj-β: 0.7, 95% Highest Posterior Density Interval: -1.4, 3.0). We did not observe a clear pattern of associations between PFAS and ASD diagnosis and the estimates were imprecise. We did not observe consistent evidence of sex differences with respect to PFAS. We will also discuss analyses of the association between prenatal OPEs and autism-related outcomes, which are currently underway.

Conclusions: We found limited evidence that prenatal PFAS blood concentrations are associated with autism-related outcomes in children. Future work should continue to examine the relationship between exposures to both legacy and emerging PFAS, other EDCs, and additional dimensional, quantitative measures of child neurodevelopment and neurobehavior.

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**POSTER SESSION — EPIDEMIOLOGY**

**433 - Epidemiology II**

**433.167 (Poster) How Socioeconomic Status and Urban-Rural Environment Can Influence Time of Late Suspicion of Autism: Results from a Pilot Study**

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Background:

There has been recent interest in the relationship between socioeconomic status, urbanicity level and the diagnosis of autism in children. Studies in the United States have found lower rates of autism diagnosis associated with lower socioeconomic status, while studies in other countries report no association, or the opposite. In a large Danish register-based cohort the urbanicity level was critical, with an earlier age of ASD diagnosis in urban areas. No specific studies on the socioeconomic factors and urban context associated with the age at ASD diagnosis have been conducted in Italy. Since a diagnostic delay may depend on a heterogeneous functioning of the local health care systems in term of waiting times, a more specific connection for our targets of interest is the age at first medical contact for diagnostic suspicion rather than age at diagnosis.

Objectives:
The focus of this pilot study is the association between age at first medical contact for diagnostic suspicion and socioeconomic status and urbanicity level in Lombardy Region, the most populous and rich Region in Italy.

Methods:

Twenty ASD cases referred to our Institute for rehabilitation from 2020 to 2021 coming from 16 municipalities were entered in the study. The age at first medical contact for parental concern was determined from parents reports. Family socioeconomic status was calculated from four factor index of social status (mother and father education achievement level and occupation level). Age and place of birth of parents (North, Centre, South Italy) and city size where the family lived, and child gender were other variables used for input data.

Results:

The study group was composed by 12 males and 8 females (mean age 7.19 yrs; range 2-11 yrs) diagnosed with autism according to DSM V criteria. The age at first medical contact for parental concern ranged between 13 and 79 months (mean= 32.8 months) while the age at diagnosis ranged between 23 and 91 months (mean= 43 months). The delta time between these two ages was in mean 10 months with a peak of 42 months. Family socioeconomic status index ranged from 4 to 15 (mean= 10.25). Correlations between age at first access and study variables are shown in table 1. Mother education years, family SES and father education years being the variables with the highest inverse correlation(R= -45; - 0.43; -0.41 respectively) resulted the most important factors for an early diagnostic suspicion.

Conclusions:

Higher mother and father education years and higher family socioeconomic status, play a substantial role in influencing positively the decision to seek medical help for ASD suspicion and consequently the age at diagnosis, while city size has a minor role.

433.168 (Poster) Investigating Sex Differences in AQ and BAPQ Factor Structures Among University Students

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Background:

Autistic girls and women are often underdiagnosed, and symptom presentation may differ between males and females. Consequently, measures used to quantify autism-related traits in autistic and non-autistic samples, such as the Autism-spectrum Quotient (AQ) and Broad Autism Phenotype Questionnaire (BAPQ), may measure traits differently across the sexes. Investigating questionnaire factor structures in a large sample of men and women from the general population would allow for a clearer picture of autistic traits in both sexes. Additionally, this investigation may inform later considerations of measurement techniques of autistic traits in both non-clinical and autistic samples.

Objectives:

1) Establish factor structures of the AQ and BAPQ in a large sample of university students;
2) Determine if these factor structures are invariant across sex assigned at birth.

Methods:

1773 participants (1044 female) completed the AQ, and 1742 participants (1024 female) completed the BAPQ. Exploratory structural equation modelling was used to explore factor loadings for each questionnaire, followed by invariance testing to determine if questionnaire models differed between sexes. Group differences in total and subscale scores of the AQ and BAPQ were compared using Mann-Whitney U-tests.

Results:

Overall, items did not cluster well onto the AQ’s original five-factor model. Configural, metric, and scalar model tests were significant (ps<.001), indicating different factor structures for men and women. More items loaded onto intended existing factors in the female model than the male model. Females scored significantly lower on total AQ, and Communication and Imagination subscales; but scored higher on Attention Switching compared to males (Figure 1).

Despite both male and female models clustering relatively well onto the BAPQ’s three-factor model, certain items loaded onto different factors for men and women. Relatedly, configural, metric, and scalar model tests were significant (ps<.001), indicating different factor structures for men and women. Females scored significantly lower than males on total BAPQ and all subscales (Figure 2).

Conclusions:

Both the AQ and BAPQ measures showed sex differences in autistic trait constructs. Specifically, multiple items on each questionnaire had high loadings for only males or only females. For the BAPQ, some items loaded onto completely different factors for men and women. These findings suggest that sex should be considered when using these measures to assess autistic traits.

Broadly speaking, females scored lower on both questionnaires, in line with previous literature. While this is generally interpreted as
resulting from autism being male-dominant, this could also be related to a lack of sensitivity to autism presentation in females. Interestingly, females also scored higher on AQ Attention Switching than males, potentially supporting the idea that autistic traits present differently in females.

Lastly, BAPQ latent factors found in the current study are better aligned with the original theoretical model in contrast to those of the AQ. This may be due to our non-clinical sample, as the AQ was originally tailored to clinical autistic populations while the BAPQ was intended to measure a broader phenotype. Despite the AQ’s popularity in non-clinical samples, current research suggests using the BAPQ to yield accurate results when studying non-clinical samples.

433.169 (Poster) Males and Females Are Markedly Similar across Domains in the Autism Inpatient Collection: Implications for Conceptualization of Profound Autism
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Background: Many studies have examined differences between male and female children with autism spectrum disorder (ASD). However, there is little research from large samples examining differences between male and female children with profound autism and severe challenging behavior, such as those who are hospitalized in specialized inpatient units.

Objectives: To describe patient demographics enrolled in the Autism Inpatient Collection (n=1354 sample). To examine for potential differences between males and females on clinical and behavioral assessments in this sample of profound ASD.

Methods: Data from 1354 hospitalized children and adolescents with an Autism Diagnostic Observation Schedule-2 confirmed ASD diagnosis from the Autism Inpatient Collection (AIC), and parent-reported data, were analyzed. The AIC is a multi-site study of patients hospitalized in inpatient units specialized for the psychiatric treatment of children with ASD and other neurodevelopmental disorders. At admission, parents completed demographic measures and the Aberrant Behavior Checklist (ABC), the Child Behavior Checklist (CBCL), Vineland-3, and Emotional Dysregulation Inventory (EDI). Descriptive statistics, including means and standard deviations for continuous variables and proportions for categorical variables, were computed. Independent samples t-tests were conducted to examine for differences between males’ and females’ for continuous variables and chi-square tests for categorical variables.

Results: The majority of patients in the sample were male (80%), White (84%), non-Hispanic (93%), mean age 12.6 years, Leiter non-verbal IQ score of 74.2, and 48.3% minimally verbal. There were no significant differences between males and females on race, ethnicity, age, length of hospital stay, IQ, or verbal ability (see Table 1). Males in our sample had significantly higher Vineland-3 externalizing problem behavior scores (20.9±1.7, vs 20.0±2.0, p=.01), and ABC-hyperactivity scores (28.4±10.8, vs 26.7±11, p=.04), compared to females. Females in our sample had significantly higher CBCL attention deficit/hyperactivity problems (68.7±7.5, vs 67.3±7.7, p<.001), dysphoria scores on the EDI (57.1±8.2, vs 55.7±8.9, p=.03), and ABC-irritability subscale scores (challenging behavior) (28.9±9.2, vs 26.6±9.5, p=.002), (see Figure 1).

Conclusions: Female children with ASD from our sample have significantly higher ADHD, dysphoria, and challenging behavior scores compared to males. Females displaying greater levels of challenging behavior is a finding that has not been well represented in the literature and should be further explored to identify related factors in this sample. While markedly similar to males on most measures, female ASD inpatients exhibit even more challenging behaviors. Given that the overwhelming majority of study participants in our sample were male, there is a need to collect additional data describing the characteristics of female children with ASD. Further exploration is warranted into the sex and gender-specific phenotypic manifestation of these differences, which could inform gender-specific interventions.

433.170 (Poster) Maternal Gestational Weight Gain and Offspring’s Neurodevelopmental Outcomes: A Systematic Review and Meta-Analysis
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Background:

Since the Institute of Medicine (IOM) released updated recommendations for appropriate and abnormal gestational weight gain (GWG) in 2009, found that GWG was increasing globally, above guidelines in 47% of pregnancies. Meanwhile, a multitude of studies have focused on the association between weight gain during pregnancy and adverse neurodevelopmental outcomes in the offspring. However, there are inconsistencies in the results of existing studies and incompleteness in the previous published meta-analysis.
Objectives:

To perform a systematic review and meta-analysis to evaluate associations between excessive or insufficient gestational weight gain and offspring’s neurodevelopmental outcomes.

Methods:

This systematic review and meta-analysis was conducted according to the criteria of Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA). The review protocol was registered in PROSPERO (Registration number: CRD42022338227). We searched publications in PubMed, Embase, Cochran databases and China National Knowledge Infrastructure (CNKI) databases, published before July 19, 2022, for observational studies stratified by total gestational weight gain. Inclusion and exclusion criteria were discussed and approved by all authors. A modified Newcastle-Ottawa Scale (NOS) was used to assess the quality of the included studies. Data were extracted by two independent reviewers. Effect size (ES) and 95% confidence intervals (95% CI) were calculated with a random-effects model to accommodate the expected heterogeneity of the observational studies. Primary outcomes were offspring with autism spectrum disorder (ASD), intellectual disability (ID), and/or attention-deficit/hyperactivity disorder (ADHD). Secondary outcome was ASD combined with ID.

Results:

Of 2075 identified studies, 20 met the inclusion criteria. Excessive gestational weight gain was associated with higher risk for neurodevelopmental disorders (NDDs; ASD & ID & ADHD: OR= 1.11 [95% CI 1.06-1.16]), ASD (OR=1.14 [95% CI 1.07-1.21]), ADHD (OR=1.08 [95% CI 1.01-1.15]), ASD with ID (OR=1.20 [95% CI, 1.04-1.39]), and ASD without ID (OR=1.12 [95% CI 1.06-1.19]). Risk for ID showed no association with weight gain (OR=1.10 [95% CI 0.97-1.24]). Insufficient gestational weight gain was associated with higher risk for ID (OR=1.19 [95% CI 1.11-1.29]); no significant association was observed with NDDs (OR=1.08 [95% CI 0.98-1.18]), ASD (OR=1.04 [95% CI 0.91-1.19]), ASD with ID (OR=1.08 [95% CI, 0.91-1.29]), ASD without ID (OR=1.10 [95% CI 0.95-1.26]), or ADHD (OR=1.08 [95% CI 0.90-1.28]).

Conclusions:

Gestational weight gain greater than or less than IOM guideline recommendations, compared with weight gain within the recommended range, was associated with higher risk for offspring’s neurodevelopmental outcomes. While interesting, this finding does not allow causal inferences given potential confounding by genetic factors, gene-environment interactions, and confounding by (pre-)pregnancy diabetes. More consideration should be given to genetically sensitive designs in future studies to enable investigation of the role of GWG in offspring neurodevelopmental disorders.

433.171 (Poster) Maternal Sars-Cov-2 Infection during Pregnancy and Child Neurodevelopmental Outcomes at 18 Months of Age

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Background: Little is known about the impact of COVID-19 during pregnancy on child neurodevelopment. Maternal inflammation during pregnancy can result from immune dysregulation due to infections or stress. COVID-19 illness may therefore result in increased maternal inflammation during pregnancy. Several lines of evidence suggest that in utero exposure to inflammation can have deleterious effects on fetal neurodevelopment and increase risk for autism spectrum disorders.

Objectives: To investigate maternal COVID-19 during pregnancy and risk of autism spectrum disorders and other neurodevelopmental outcomes in a large and diverse population receiving medical care in the same integrated healthcare delivery system.

Methods: We conducted a longitudinal cohort study of women who were members of Kaiser Permanente in Northern California (KPNC), pregnant during the COVID-19 pandemic from March to December 2020 and delivered a liveborn baby (N=35,754). We ascertained maternal COVID-19 infection status and child neurodevelopmental outcomes from information prospectively recorded in the KPNC electronic health records. Maternal COVID-19 infection was defined by a positive SARS-CoV-2 PCR test result during pregnancy. We identified all children diagnosed with any neurodevelopmental disorder (NDD) or an autism spectrum disorder (ASD) in the first 18 months of life. We fit crude and adjusted logistic regression models to estimate the association between maternal COVID-19 during pregnancy and NDD diagnosed by 18 months of age. Covariates included maternal age at delivery, maternal race/ethnicity (Asian, Black, Hispanic, White, Other), maternal insurance type (commercial, government), child sex, and the child’s length of KPNC membership after birth (months).

Results: Of the 626 (1.75%) women who had a positive SARS-CoV-2 PCR test during pregnancy, 1.9% were in the first trimester, 21.2% in the second trimester, and 76.8% in the third trimester. Women with a positive test were more likely to be younger, Hispanic, have less
Background: The human microbiota can be looked at as the interface between genes and an individual’s history of environmental exposures, thus providing new insights into the neurodevelopment and behavioral phenotypes. Recent studies demonstrated that children with ASD and gastrointestinal symptoms show major fecal microbiota alterations. The interventional arm of this study seeks to study the changes of the micro-environment of the gastrointestinal tract (and associated inflammatory consequences) at an early age through dietary intervention. This interventional study will help to understand and identify potential biomarkers of dysbiosis in infants with ASD through the use of the probiotic called Visbiome. It has been reported that the usage of Visbiome in children with ASD showed a decrease in gastrointestinal symptoms (GI) and an increase in adaptive functioning (Santocchi et al, 2020). In conjunction with Visbiome, the infants enrolled in the study will have ASD evaluations that includes the Brief Observation of Symptoms of Autism (BOSA), the Vineland Adaptive Behavior Scale, Developmental-Profile-3 and 4, and the Social Responsiveness Scale-2. The symptoms of ASD will be evaluated through these scales to measure ASD symptom changes before and after a 6-month Visbiome treatment.

Objectives:

- To observe the development of ASD symptoms in 600 at-risk infants for ASD in Ireland, Italy, and the United States.
- To enroll participants from the Observational study who have undergone comprehensive ASD evaluation into the Interventional arm of the study.
- To evaluate the effects of Visbiome on ASD symptoms and Gastrointestinal Symptoms

Methods: The BOSA Scale is designed to measure ASD behavioral symptoms including communication, social interaction, restricted and repetitive behaviors. For the BOSA assessment, checklists can be used to view symptom presence across each diagnostic domain. These children will be categorized into the following groups: Little-to-no concern, mild-to-moderate concern, and moderate-to-severe concern. Mild-to-moderate concern and moderate-to-severe concern will be eligible to participate in the interventional arm of the study. The Vineland Adaptive Behavior Scale, DP-3/4, and the SRS-2 scale will be used in conjunction with the BOSA to further evaluate the child’s functioning in physical skills, adaptive behavior, social-emotional scale, cognitive scale, and communication. In order to evaluate gastrointestinal symptoms, the Gastrointestinal Symptom Rating Scale (GSRS) and food diaries will be administered on a monthly basis.

Results: While analysis is ongoing, currently, 33% of children in the Observational Study are currently showing mild-to-moderate and moderate-to-severe concern as measured by the BOSA. Results from Vineland Adaptive Behavior Scale, Developmental Profile-4, and Social Responsiveness Scale-2 will also be reported. In May 2023 we will present the results of the Visbiome interventional arm of the study.

Conclusions: Overall, our findings are on-going and so far show a high-risk of developing ASD from having a sibling already diagnosed. The treatment arm of Visbiome may contribute to reducing ASD and GI symptoms.

433.172 (Poster) Multi-Centered Early Developmental Evaluations and Probiotic Treatment of Infants at-Risk of Autism Spectrum Disorder from Ireland, Italy, and the United States

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433.173 (Poster) Prematurity and Autism Spectrum Disorder: A Look at the Interpretation of Screening and Diagnostic Tools in Patients at a Brazilian Children's Hospital

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Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental delay characterized by difficulties in social communication and the presence of repetitive, restricted behaviors and/or interests. This disorder appears in early childhood and affects the autonomy of the individual in a heterogeneous, direct, and chronic way. There is a genetic basis and environmental factors that can act as "triggers", such as prematurity and maternal age. This population needs a follow-up to avoid further damage.

Objectives: To evaluate the incidence of ASD and related risk factors in children who were born at less than 34 weeks of gestational age at a 12-month follow-up, using screening and diagnostic tools.

Methods: Sixty-one subjects born in a Children's Hospital of a Brazilian Medical School were evaluated at two different times: Time 0 (T0); subjects with corrected age between 18 and 24 months and Time 1 (T1); these same participants 12 months later. In T0, the Modified Checklist for Autism in Children - MCHAT was applied to all participants and, in T1, the Autism Behavior Checklist - ABC. After these assessments, patients were assigned with ASD (ASD+) and without ASD (ASD-). With the ABC, it was possible to identify the permanence, loss or emergence of signs for autism when comparing T0 with T1.

Results: The mean age and the standard deviation of the 61 participants was 21.2±3.3 months at T0 and 33.5±2.1 months at T1 (p<0.0001). The total maternal age was 29.4±5.7 years. At T0 for MCHAT, it was observed that 44 (72%) patients were MCHAT- and the remain 17 (28%) had suspicious signs of ASD (MCHAT+), of these, 5 (29%) supported ASD criteria at T0 (MCHAT+ and ABC+). Of the total MCHAT- in T0 (n=44) only 1 (2%) was ABC+ in T1. Therefore, 10% (n=6) of patients were diagnosed with ASD, furthermore, maternal age did not differ between ASD+ (29.1±5.3 years) and ASD- (29.4±5.8 years; p =0.903). Individuals with ABC+ (n=6) had positive responses to critical questions 7, 9 and 14 of the MCHAT (100%, 67% and 83%, respectively) compared to those with ABC- (n=55) (9%, 27% and 18%, respectively) (p<0.001). A higher total ABC score was observed for ASD+ (88.3±19.9 points) compared to ASD- (27.3±12.8 points; p<0.0001), these data reflect the increased mean values of all ABCs in patients with ASD+ compared to ASD- (p<0.05 for all).

Conclusions: In this context, prematurity appears to be a risk factor for ASD, unlike maternal age. In addition, it is important to note that all individuals with ASD+ responded positively to 3 out of 6 critical MCHAT questions, in addition to having an overall ABC score above average. These data serve as a potential warning score for ASD in the follow up this at-risk population.

433.174 (Poster) Prenatal Mood and Anxiety Disorders and Risk of Neurodevelopmental Disorders in Children

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Background: One in five women suffer from mood and anxiety disorders during pregnancy. These disorders are associated with an increased risk of neurodevelopmental disorders (NDDs) in children. Interpreting this association is complicated: (a) most studies only focus on depression despite a substantial morbidity of other disorders. Anxiety disorders and obsessive-compulsive disorder (OCD) are equally as prevalent; (b) there is a gap in our understanding of the pathways by which prenatal mood and anxiety disorders (PMADs) are associated with risk of NDDs in offspring; and (c) paternal PMADs also contribute to the offspring’s risk of NDD, but research on it is scarce. The aim of this project is to measure the extent to which maternal and paternal PMADs increase the risk of NDDs: autism spectrum disorder (ASD), intellectual disability (ID), and attention-deficit/hyperactivity disorder (ADHD) in offspring.

Objectives: To determine the association between active maternal and paternal PMADs and an increased risk of NDDs in offspring.

Methods: We systematically searched all English-language articles in the databases PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), and OVID from January 1, 1988 to September 16, 2022. Two authors independently screened all articles for inclusion. Data were extracted independently by two authors. We included all articles referencing prenatal anxiety-related disorders, depression, OCD, and offspring ADHD, ASD, and ID. For each included manuscript, we checked the quality of the study design, the power of the study, the appropriate statistical techniques, and other related criteria. We performed random-effect meta-analyses for the impact of each PMADs on the risk offspring NDDs.

Results: We identified 1,971 relevant articles in the literature, and 150 articles fulfilled the inclusion criteria for the systematic review. First results from our study are already implicating maternal prenatal anxiety-related disorders and depression are associated with increased risk of ADHD, ASD, and ID in offspring. Our analyses also highlight that there are very significant gaps in the literature. While some PMADs, such as prenatal OCD, have been reported among fathers, research on prenatal paternal mental health during pregnancy has lagged behind that of prenatal maternal mental health. In particular, the association between paternal PMADs and risk of NDDs in offspring is mostly unknown and bears mixed results. Some studies have shown that paternal anxiety and depressive symptoms are positively associated with externalizing behaviors in offspring, including oppositional-defiant behavior and conduct problems. In contrast, other studies either did not find any association, or demonstrated a weak or negative association between paternal PMADs and offspring NDDs.

Conclusions: While still preliminary, our results indicate that PMADs contribute to the risk of NDDs in offspring. This research is crucial as it addresses critical gaps in understanding associations between PMADs and the risk of NDDs in children. This will help guide future
research by pinpointing probable mechanisms of this association which in turn can influence early interventions for PMAD management and/or NDD prevention.

433.175 (Poster) Prevalence of Self-Reported Medication Use during Early Pregnancy in the Early Autism Risk Longitudinal Investigation (EARLI)

Background: Medication use during pregnancy presents considerations for both the mother and child. Previous work has described commonly used medications among pregnant women in the general population, and their relationships to child outcomes like autism, but medication use during early pregnancy among women who have a prior child with a developmental disorder, which may alter medication use patterns and prevalence, is less well characterized.

Objectives: To characterize common maternal medication use during early pregnancy in families with at least one child with autism.

Methods: Participants were drawn from the Early Autism Risk Longitudinal Investigation (EARLI) study, a cohort enrolling pregnant mothers who already had a child with autism and followed the subsequent child to 36 months of age. Data on self-reported maternal medication use during first or second-trimester pregnancy was used to estimate the prevalence of medication use during early pregnancy and to ascertain the most commonly reported medications. Descriptive statistics were used to assess potential differences in medication use by maternal characteristics. In addition, the prevalence of medication use by category of indications was compared to external reference samples.

Results: A total of 234 pregnant mothers were included in the analyses. Use of any reported medications during early pregnancy was reported by 76% (n=177) of mothers, with most reporting common over-the-counter (OTC) medications, including pain medication (48%) and GI-related medications (33%). In addition, 32% of those reporting any medication use reported medications (OTC or prescription drugs) for allergy/asthma-related illness, while 19% reported the use of antibiotics, and 10% reported psychotropic medications. The five most commonly reported medications were acetaminophen (n=82, 34%), followed by ibuprofen (n=32, 13%), calcium carbonate (n=31, 13% antacid), pseudoephedrine (n=26, 10%, nasal decongestants), and dextromethorphan guaifenesin (n=13, 5%, cough suppressants). The most reported prescription-only drug was azithromycin (n=12, 5%, antibiotics). Despite overall high prevalence of any medication use, use of prescription drugs and categories of drugs like psychotropics were similar in this population to reference comparison groups including NHANES. Comparing mothers who reported any medication use to those with no reported use, the majority of the former group reported White race, while mothers who reported no medication use were more likely to report non-White race. Mothers in the medication-use group also had a higher average BMI (mean=28.3, SD=7.21) relative to mothers in the non-use group (mean=25.6, SD=4.89). Those in the non-use group were more likely to have a lower income than the medication-use group (17.5% vs 29.4%).

Conclusions: In this autism family cohort, medication use during pregnancy across categories of medications was common, with pain-related medication being the most common category. Approximately 1 in 3 mothers reported the use of acetaminophen during the first half of the pregnancy. Differences in medication use by maternal BMI and race support the need to account for these factors in analyses of associations with child outcomes. Further analyses will examine these maternal medication use categories in association with child autism-related outcomes in this population.

433.176 (Poster) Proportional over-Representation of Gender-Diverse Identities in Two US-Based Autistic Adult Samples Recruited through the SPARK Database

Background: Previous literature indicates proportional over-representation of autism and, more broadly, autistic traits, within gender diverse populations (i.e., those with gender identity/identities incongruent with their sex assigned at birth). Studies of gender diversity and autism, as well as a recent study suggesting developmental and mental health phenotypes differentially related to gender identity vs. assigned sex at birth, emphasize the importance of studying gender as it relates to autism presentation and diagnosis (Strang et al., 2020, Strang et al, 2021, Kallitsounaki & Williams, 2022; Warrier et al., 2022). Several recent studies report a proportional over-representation of gender identity diversity in autism. A study of a large sample of autistic adolescents and adults (n = 675) from the Netherlands Autism...
Register showed a rate of trans and nonbinary identities at 15% (Walsh et al. 2018; see also Dewinter De Graag, & Begeer, 2017). In comparison, just 3.9% of the general population in the Netherlands had a trans or nonbinary identity (Kuyper & Wijsen, 2014). A subsequent study found that 6.5% of the autistic adolescent sample (n = 573) and 11.4% of the autistic adult sample (n=807) self-reported a desire to be a gender other than what they had been assigned at birth, compared with 3.1% of a standardization sample of adolescents aged 11-18 years old (van der Meisen et al., 2018). Research documenting the prevalence and experience of gender diversity within autistic adults is still limited in US-based samples.

Objectives: This study examined rates of gender diversity and mental health conditions in autistic adults who enrolled in an online study unrelated to the topic of gender identity.

Methods: We examined rates of gender diversity and co-occurring mental health conditions in two independent moderately sized, US-based autistic adult samples (total n=448) enrolled in two separate online studies investigating predictive processing.

Results: In this study, 16% of autistic adults in Dataset 1 and 20% of autistic adults in Dataset 2 reported being gender diverse (having a gender identity or identities different from their sex assigned at birth). Additionally, participants who reported being gender diverse, compared to those who did not, were up to 6 times more likely to report an anxiety and/or mood disorder.

Conclusions: The finding of a proportional over-representation of gender diversity in autistic adults is consistent with previous reports, though somewhat higher than prior estimates (Walsh et al. 2018; see also Dewinter De Graag, & Begeer, 2017). This study highlights the need for improved characterization of gender diversity in autism, including future research with larger sample sizes, to investigate the intersection between gender diversity, autism presentation, and mental health and resilience.

433.177 (Poster) Revisiting Smoking and Autism Spectrum Disorder from a Multigenerational Perspective: Findings from a Nation-Wide Prospective Cohort Study


Background: Animal studies have shown that exposure to cigarette smoke during pregnancy can induce neurobehavioral anomalies in multiple subsequent generations, possibly through effects on the germline. However, little work has examined such effects in humans.

Objectives: To explore the potential multigenerational association between smoking during pregnancy and risk of autism spectrum disorder (ASD) among grandchildren using three-generation data.

Methods: We studied 66,240 mothers (G1) and grandmothers (G0), and 149,000 grandchildren (G2) in the Nurses’ Health Study II. In 1999 and 2001, mothers (G1) and grandmothers (G0) reported the grandmothers’ (G0) or their own smoking during pregnancy, respectively. Grandchildren’s (G2) ASD diagnoses were reported in 2005 and 2009. Odds ratios (OR) were estimated for G2 ASD associated with grandmaternal (G0) smoking during pregnancy, adjusting for key confounding factors such as socioeconomic status. Potential effect modification by different factors was also explored.

Results: Among grandmothers, 15,508 (23.4%) smoked during pregnancy, and 840 (0.6%) grandchildren were diagnosed with ASD. We found no association of grandmother smoking during pregnancy with grandchild ASD (adjusted OR [aOR] = 1.05; 95% CI: 0.88, 1.26). While this association did not differ by G2 birth year, grandmaternal smoking during pregnancy was weakly associated with grandchild ASD (aOR = 1.25; 95% CI: 0.94, 1.66) among mothers who gave birth at advanced age (≥35 years; 17,246 G0/G1 and 22,065 G2). Using G0 report of their own smoking during pregnancy, we observed a dose-response relation with cigarettes smoked per day by the grandmother (1–14 cigarettes: aOR = 1.22; 95% CI = 0.71, 2.08; 15+: aOR = 2.14; 95% CI = 1.15, 3.97) among the grandchildren born at advanced maternal age (≥35 years; 7,159 G0/G1 and 9,227 G2). Results were similar when both maternal (G1) and grandmaternal (G0) smoking were modeled together.

Conclusions: Grandmaternal smoking during pregnancy was associated with higher grandchild odds of ASD among grandchildren delivered at advanced maternal age. Our results suggest potential persistent impact of gestational exposure to environmental insults across three generations and combined effects of factors affecting ASD risk.

433.178 (Poster) Social and Economic Factors Associated with Geographic Variation in Children Receiving Educational Services for Autism

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Background:
Autism spectrum disorder (ASD) prevalence has been increasing in the state of Missouri in recent years. This increase is partially attributed to better diagnostic tools and early identification. Previous studies suggest that there may be geographical differences in access to diagnostic services and early treatment, but this has not been explored in the state of Missouri. Early intervention for children with ASD is crucial for successful outcomes and geographical analyses can help identify communities at risk.

Objectives:

The goal of this study is to assess the geographic variation in children receiving educational services for ASD and to assess if school district-level variability is associated with social and economic characteristics such as poverty, education, or employment characteristics.

Methods:

Data were obtained from Missouri Department of Elementary and Secondary Education for 2020. Percentage of enrolled students who were receiving special educational services for ASD (hereafter referred to as ASD prevalence) were calculated by school district. Prevalence data were merged with U.S. Census data that includes school district-level percentage of individuals and families living below national poverty level, percentage of adults age 25 and older who graduated from high school, and rate of unemployment among people aged 16 and older in the civilian work force. Mean ASD prevalence was compared across districts in the 75th percentile compared with districts in the 25th percentile of poverty, educational attainment, and unemployment rates using t-tests.

Results:

A total of 502 school districts in the state of Missouri were used for this analysis. Mean (SD) ASD prevalence by school district was 15.1 (8.4) per 1,000 enrolled students. ASD prevalence by school district ranged from 1.8 to 71.4 per 1,000 enrolled students. Mean (SD) ASD prevalence by poverty level was 12.6 (6.1) per 1,000 in high poverty districts (≥12% of families lived below the national poverty level) compared to ASD prevalence of 15.8 (7.4) per 1,000 in low poverty districts (≤5.5% of individuals and families lived below poverty) (p<.001). Mean ASD prevalence by unemployment rate was 13.9 (7.1) per 1,000 in districts with low (≤3.2%) unemployment rates and 13.9 (7.1) per 1,000 in districts with high (>5.3%) unemployment rates (p=.991). Mean ASD prevalence by percentage of people age 25 and older who were high school graduates was 17.0 (7.5) per 1,000 in districts with low percentage of high school graduates (<36.9%) compared to ASD prevalence of 13.4 (6.7) per 1,000 in districts with a relatively higher (≥43%) percentage of high school graduates (p<.001).

Conclusions:

There are substantial differences in the rates of children receiving special education services for ASD by Missouri school district. These rates also differ by percentage of families in the school district-level living below national poverty level and the percentage of people in the district age 25 and older who are high school graduates. This may reflect differential access to diagnostic services and resources for children with ASD. These results characterize the potential for GIS analysis in identifying at risk communities and can help providers and policymakers allot resources to higher risk areas.

433.179 (Poster) Trait Trends: Distribution of Autistic Traits across Time in Echo Birth Cohorts


Background: Autism Spectrum Disorder (ASD) diagnosis has become more common in the last two decades. It is unknown whether this increase reflects true increases in the presence of the condition, or is due to increased recognition and diagnosis. Dimensional approaches in understanding childhood psychopathology are growing as they better capture the full range of phenotypic differences among those who do and do not meet diagnostic thresholds, and may help to address questions surrounding prevalence increases.

Objectives: Our goal was to determine whether ASD traits have become more common over time by examining whether ASD traits are higher in children born in later years.

Methods: Participants were drawn from cohorts in the Environmental influences on Child Health Outcomes (ECHO) program. Information on demographic factors including the child’s year of birth, age at assessment, sex, and Social Responsiveness Scale (SRS) scores were obtained for children by parent report. For children with multiple SRS assessments, we selected the SRS conducted closest to when the
Background: Emotional wellbeing is a priority for the autism community. Emotional wellbeing incorporates not only the absence of mental disorder symptoms, but also positive developmental outcomes such as emotion regulation. A life course perspective in autism research holds promise for improving emotional wellbeing outcomes. Life course epidemiology (LCE) is a growing theoretical framework that has contributed to key developments in several public health domains, such as cardiovascular health. Key LCE concepts include the accumulation and interaction of risk/protective factors over time; critical or sensitive periods during development, maturation, and senescence; and how environmental exposures during earlier stages of life impact later stages of life. Central to a LCE is integration across varying domains of development and quality-of-life outcomes, including physical wellbeing, emotional wellbeing, and participation.

Objectives: We conducted a scoping review of prior reviews of emotional development and wellbeing in autism research, to synthesize and map review findings from a LCE perspective.

Methods: We followed PRISMA guidelines for scoping reviews. We searched Medline, ERIC, and CINAHL for reviews using the following inclusion criteria: 1) autism as the population; 2) included an affect-related developmental or wellbeing outcome; 3) related to a life course epidemiology concept; 4) available in English; and 5) peer reviewed. Emotional development and wellbeing outcomes were: affective experience (emotion, stress, mood), affective psychiatric disorders/symptoms, harm to self or others, and affect-related development (e.g., emotion regulation, neurophysiology, transdiagnostic constructs). LCE concepts included accumulated risk/protection, critical or sensitive periods for development and intervention, cohort effects, age differences/effects, period effects, intergenerational effects, developmental trajectories, exposure-outcome relationships across life stages, and long-term outcomes of services or intervention. Extracted data included but were not limited to outcome(s), LCE construct(s), and findings.

Results: From 4,196 abstracts we identified 59 reviews that met all inclusion criteria. Reviews of affect-related developmental outcomes were most common (K=25), followed by comorbid psychiatric disorders/symptoms (K=17), neurophysiology (K=9), and suicide, self-injury, or aggression (K=6). Regarding LCE concepts, reviews either synthesized evidence for age group differences (K=28) or provided perspectives on developmental trajectories across childhood and adolescence (K=27). Three reviews synthesized findings on risk factors for negative emotional wellbeing outcomes (K=3). Nearly all included reviews emphasized deficits or negative outcomes in relation to typically developing peers. The majority of central LCE concepts were not present in the included reviews. None of the reviews of interventions identified by our database searches addressed long-term effects on emotional wellbeing.

Conclusions: There is growing emphasis on emotion-related outcomes “across the lifespan” for the autism population. In the extant body of reviews this perspective is limited in its operationalization to comparisons of outcomes across age groups, from a deficits perspective. LCE can help expand this important field of research by providing a rich set of theoretical constructs for identifying gaps in current knowledge, as well as guidance on methods and analyses to address novel research questions. Such knowledge can provide a basis for improving environments, interventions, policies, and services with a positive impact on emotional wellbeing for the autism spectrum population.

433.181 (Poster) Use of Adductomics to Identify Environmental Exposures and Biological Pathways Associated with Autism Risk Using Newborn Dried Blood Spot Samples
Background: Increasing evidence suggests that early life exposures to environmental toxins, including air pollution, are associated with autism spectrum disorder (ASD). However, biomarkers associated with environmental exposures are widely lacking and often transient. In addition, ascertaining biospecimens during pregnancy and early periods of development to assess the prenatal environment remains largely infeasible as ASD is diagnosed clinically based on developmental features that emerge in childhood, without the benefit of reliable or easily identifiable prenatal diagnostic risk indices.

Objectives: To address these challenges, we previously identified relationships between air pollution exposure during pregnancy and human serum albumin Cys\(^{\alpha}\) (HSA-Cys\(^{\alpha}\)) adducts in newborn dried blood spots (DBS) samples in a cohort of 120 infants, selected to maximize the range of residential air pollution exposure during the entire pregnancy to PM\(_{2.5}\), PM\(_{10}\), NO\(_2\), O\(_3\). This study builds on these findings by characterizing identified adducts associated with air pollution in a cohort of 150 with ASD and 150 controls, along with an expanded panel of 54 annotated adducts in newborn DBS samples.

Methods: Newborn DBS were obtained from a state archived cohort of 150 infants with ASD and 150 control infants without any developmental disability, born at Kaiser Permanente Southern California (KPSC) hospitals. Blood was extracted from 4.7mm DBS punches and HSA was isolated using methanol to precipitate interfering proteins. After trypsin digestion, samples were analyzed using an Agilent 6490 QqQ mass spectrometer in dMRM mode, and adduct concentrations were normalized using a housekeeping peptide.

Results: Results indicate successful measurement of the initial six adducts associated with PM\(_{2.5}\) and O\(_3\) during pregnancy (including direct oxidation products, adducts formed with small thiol compounds, and adducts formed with reactive aldehydes), as well as for an expanded panel of 48 additional adducts. Additional analysis currently underway will report findings from linear regression models to explore discordant adduct features associated with ASD status.

Conclusions: Environmental exposure occurring during pregnancy can alter biology and leave measurable impacts on the developing infant captured in the newborn DBS adductome. Here, we successfully characterized the prenatal HSA-Cys\(^{\alpha}\) adductome in a cohort of 150 infants who were later diagnosed with ASD and 150 controls. Adducts associated with ASD will be reported, with a focus on oxidative stress related adducts that might inform oxidative stress pathways that were previously associated with air pollution exposures.

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Methods: Newborn DBS were obtained from a state archived cohort of 150 infants with ASD and 150 control infants without any developmental disability, born at Kaiser Permanente Southern California (KPSC) hospitals. Blood was extracted from 4.7mm DBS punches and HSA was isolated using methanol to precipitate interfering proteins. After trypsin digestion, samples were analyzed using an Agilent 6490 QqQ mass spectrometer in dMRM mode, and adduct concentrations were normalized using a housekeeping peptide.

Results: Results indicate successful measurement of the initial six adducts associated with PM\(_{2.5}\) and O\(_3\) during pregnancy (including direct oxidation products, adducts formed with small thiol compounds, and adducts formed with reactive aldehydes), as well as for an expanded panel of 48 additional adducts. Additional anlaysis currently underway will report findings from linear regression models to explore discordant adduct features associated with ASD status.

Conclusions: Environmental exposure occurring during pregnancy can alter biology and leave measurable impacts on the developing infant captured in the newborn DBS adductome. Here, we successfully characterized the prenatal HSA-Cys\(^{\alpha}\) adductome in a cohort of 150 infants who were later diagnosed with ASD and 150 controls. Adducts associated with ASD will be reported, with a focus on oxidative stress related adducts that might inform oxidative stress pathways that were previously associated with air pollution exposures.
adjusted Cox regressions to assess the associations between standardised autism PRS and incidence of dementia, MI and stroke over ~10 years of follow-up. Lastly, we performed two-sample Mendelian randomisation (MR) using the PGC + iPSYCH autism GWAS summary statistics dataset and outcome GWAS summary statistics datasets with the largest sample sizes. We assessed any causal effects between genetic liability to autism and cardiometabolic phenotypes using inverse variance weighting, MR Egger and weighted median MR methods.

Results:

Up to 462,652 participants were included in PRS analyses. There was good evidence for associations between standardised autism PRS and T2DM (OR=1.02; 95% CI 1.01, 1.04), and HDL (b=-0.003 95% CI -0.004, -0.002), SBP (b=-0.16; 95% CI -0.22, -0.11) and BMI (b=0.03; 95% CI 0.02, 0.05). Out of the adverse health outcomes, we found that a SD increase in autism PRS was associated with a 2% increase in risk of incident MI (HR=1.02; 95% CI 1.00, 1.05). From the MR analyses, we observed that genetic liability to autism had a causal effect on diabetes (IVW estimate=1.20; 95% 1.05, 1.37, p 0.006). All other results were null findings.

Conclusions:

Cardiometabolic health in autistic adults may, in small part, be influenced by shared genetics between autism and some cardiometabolic outcomes. There was good evidence for the causal effect of genetic liability to autism on risk of T2DM, which should be investigated further. We also observed good evidence for an association between standardised autism PRS and a small increase in risk of incident MI.

433.183  (Poster) Describing Multidomain Positive Health Outcomes in Autistic Children in the Echo Program


Background: Positive health outcomes are not well characterized in children on the autism spectrum. While a significant work in autism research has focused on developing interventions to improve outcomes in autistic individuals, epidemiologic analyses have focused to large extent on predicting the diagnosis itself, rather than variability within it. Existing work has not sufficiently characterized multidimensional health outcomes, such as wellness, life satisfaction, and positive affect among individuals on the autism spectrum, particularly in large population samples. Furthermore, existing work focuses on positive health outcomes within a single domain, such as sleep health. A more comprehensive understanding of well-being in autism, capturing multidimensional aspects of health, is therefore needed.

Objectives: To describe and characterize positive health outcomes across three core domains – overall well-being, emotional health, and physical health – in a large sample of autistic and non-autistic children within the Environmental influences on Child Health Outcomes (ECHO) program.

Methods: Participants were 4511 individuals (286 autistic individuals) ages 5-20, from 29 cohorts in the ECHO Program. Descriptive statistics were used to characterize positive health outcomes across three primary domains: overall well-being (PROMIS Global Health, PROMIS Life Satisfaction, PROMIS Peer Relationships), emotional health (CBCL Emotional Dysregulation, PROMIS Positive Affect, PROMIS Depressive Symptoms), and physical health (body mass index, PROMIS Sleep Disturbance, PROMIS Sleep Impairment, PROMIS Physical Activity). In ongoing work, latent class analyses will be conducted to define clusters of positive health outcomes for children on the autism spectrum. Demographic factors, including age, assigned sex, and race/ethnicity, will be examined in relation to positive health outcome clusters.

Results: The autistic sample had a higher proportion of male participants than the non-autistic sample (Table 1). Groups had approximately equal proportions regarding race, ethnicity, household income, and maternal education. Participants on the autism spectrum were more likely than non-autistic participants to be born pre-term, have co-occurring intellectual disability and/or Attention-Deficit/Hyperactivity Disorder, and have a sibling on the autism spectrum. A higher proportion of autistic participants were recruited from ECHO cohorts that recruited individuals with a familial history of autism and infants born pre-term (indicating a higher likelihood of being diagnosed with autism). Outcome measures were administered at similar ages across the two groups (7-13 years across measures). Within the domain of well-being, autistic participants scored lower on measures of global health, life satisfaction, and peer relationships (Table 2). Within the
The emergence of tele-mentoring programs designed to build the competence of medical providers, such as Project Extension for Community Healthcare Outcomes when adapted and targeted to caregivers, may be able to support families in developing the requisite knowledge, skills, and confidence needed to effectively manage and coordinate their child’s care. This panel will present four unique family targeted applications of the ECHO model to meet a common goal: Supporting families of children with autism. Nevill will demonstrate how ECHO can be used to build behavior management knowledge, self-efficacy, and empowerment among caregivers of children who lost services during COVID-19. Brewer-Curran will discuss ECHO Autism: Family Advocates as a feasible and acceptable model to equip family and self-advocates with skills to navigate complex systems of care and education. Moody will describe the application of the ECHO model in an extremely rural/frontier state that has very limited services for children with autism. Hess will discuss Family ECHO: Autism as an effective model to build knowledge and confidence for parents caring for children with autism. Through these applications, we will explore how ECHO can be used to build community, empower families, equip them with knowledge and resources, and build their self-efficacy.

223.001 (Panel Discussion) Using the Echo Model to Deliver Virtual Behavior Management to Families
R. E. Nevill, M. O. Mazurek, G. E. Lovette, K. Bateman and N. Badgett, (1)Curry School of Education and Human Development, University of Virginia, Charlottesville, VA, (2)University of Virginia, Charlottesville, VA, (3)College of Education, University of Washington, Seattle, WA

Background: Children with autism and related developmental concerns experience significant wait times to accessing behavior support services, despite challenging behavior being consistently reported as a high contributor to parenting stress. During the COVID-19 pandemic, this issue was further compounded by the closure of schools and clinic-based services, and the increased anxiety and adjustment difficulties many children with autism and related developmental concerns experienced due to reduced community access.

Objectives: The present study investigated the effectiveness of the ECHO model for delivering interdisciplinary education and support to parents of children with autism and related developmental concerns demonstrating challenging behavior during the COVID-19 pandemic. ECHO is a telehealth-based consultation model that, in this application, connects a multidisciplinary “hub” team of experts with a community-based network of parents for problem solving and educational workshops around challenging behavior. While ECHO is traditionally applied with community-based practitioners, using this model with parents and families has the potential to accelerate the rate at which key knowledge and resources are connected directly to families.

Methods: Participants (n = 30) were parents from across the United States, representing households within rural (53%), urban (27%), and suburban (20%) communities and from a broad range of socioeconomic backgrounds. A pre-post intervention design was used to evaluate the effect of ECHO on participants’ knowledge of behavior modification strategies, self-efficacy in behavior management, empowerment as caregivers, negative emotional reactions to challenging behavior, and understanding of the function of behavior. Participants’ children were primarily diagnosed with autism (38%), ADHD (43%), and anxiety disorders (24%) and were demonstrating a broad range of challenging behavior at home, most frequently defiance, verbal aggression, hyperactivity, and inattention at rates of multiple times per day.

Results: The intervention resulted in significantly increased knowledge \( t(1) = 8.30, p < .001, g = 1.50 \), self-efficacy in managing challenging behavior \( t(1) = 4.39, p < .001, g = 0.79 \), and caregiver empowerment \( t(1) = 4.48, p < .001, g = 0.81 \), as well as significant reductions in depressed/angry \( t(1) = -3.50, p < .001, g = 0.64 \) and fearful/anxious \( t(1) = -2.79, p < .001, g = 0.51 \) reactions to challenging behavior. Satisfaction ratings showed that ECHO was highly acceptable to families (M = 4.77/5). Parents reported really
valuing ECHO, and particularly that participating in ECHO provided them with access to a network of peers experiencing similar difficulties at home, as well as consultation from an interdisciplinary team around their child’s behavioral support needs.

**Conclusions:** ECHO allows flexibility in its ability to be offered on free teleconferencing platforms, making it easier for families in rural and underserved areas to access support. This novel adaptation of ECHO has promising implications for supporting children and their families beyond the COVID-19 pandemic as an approach for building knowledge, empowerment, and self-efficacy, as well as peer connectedness and reduced sense of isolation.


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**Background:**

The prevalence of autism spectrum disorder (ASD) continues to rise, with 1 in 44 children diagnosed across the United States (CDC, 2020). For families to access best-practice autism screening, assessment, and treatment to address the core symptoms of autism and co-occurring conditions, they must interact with a wide variety of systems and professionals within those systems to address the multifaceted needs of an autistic person and their family. However, these systems remain complex and fragmented; navigating them can be overwhelming and challenging to coordinate necessary services, supports, and resources (Brewer, 2018).

The ECHO Autism: Family Advocates program was developed to increase access to self- and family advocates with increased self-efficacy in systems navigation and best practice autism resources. This program utilizes the ECHO model®, where an interdisciplinary team of content experts share best-practices with family and self-advocates through ongoing guided practice and case-based learning.

**Objectives:**

- Increase self-efficacy in navigating complex systems of care
- Increase self-efficacy in connecting others in underserved communities to best-practice information/resources, services and supports
- Increase self-efficacy in advocacy and leadership skills

**Methods:**

University of Missouri ECHO Autism Communities developed the Family Advocates program in 2020. The hub of content experts includes representatives from core systems involved in autism and disabilities broadly including disability law, healthcare, education, employment, policy, and community resources across the life span. Participants are engaged self- and caregiver advocates eager to advance their professional skills to serve as a resource to others in their community. This program consists of 12-18, 90 minute, twice monthly sessions consisting of short didactic learning and deidentified case discussion related to systems navigation. Pre-training and program satisfaction, as well as pre- and post-program surveys, were collected to measure participant outcomes utilizing the ECHO Model®. The program also implemented changes throughout each of the series by using quality improvement methodology.

**Results:**

One hundred-twenty unique advocates have participated, and 100% of participants report that participation in ECHO Autism: Family Advocates program was a good use of their time and that they respected the expertise of the content experts. Eighty-eight percent of attendees who presented a case rated the case-based discussions and recommendations as “very helpful,” or “helpful” on a four-point scale. Additionally, 89% of attendees reported that participating in the program enhanced their ability to navigate systems of care and education for their own children, as well as their ability to mentor and coach other families. Overall self-efficacy improved in six of seven domains from pre- to post-program test, with the greatest rates of growth in the domains of employment and state eligibility services. Results from the third cycle of the program will be available prior to INSAR.

**Conclusions:**

The ECHO Autism: Family Advocates program is a feasible and acceptable model demonstrating increased self-efficacy in systems navigation and autism best practices among autistic and caregiver advocates. Replicating this program in additional states/regions is necessary to generalize program findings.
**223.003 (Panel Discussion)** Echo for Families: Improving Family Outcomes in Frontier Areas through a 5-Year Virtual Community of Practice


**Background:** Systems of care are often difficult for families of children with ASD to navigate, which can lead to significant declines in family functioning, wellbeing and parent mental health. Rural residents face additional challenges due to lack of providers, long distances to access providers, and must often manage their children’s care needs on their own. Due to these challenges, programs that provide families with supports and information are needed that are uniquely tailored to rural communities.

To address these challenges, we adapted The Extension for Community Health Outcomes (ECHO) model (Arora, et. al, 2014, Hardesty, et. al 2020) for use with family members of children with ASD (Moody, et al, 2020). The initial implementation delivered a series of sessions on family mediated applied behavior analysis. Later implementations deliver content on navigating systems of care, resiliency and other family selected topics that align with the unique needs of families in rural communities (Singh, et al, 2018). This allows for the development of a virtual community of support that the families can rely on to combat social isolation and use to develop new skills to support their children. This network has been translated into Spanish and is being adapted to implement best practices in the RUBI model with their families.

**Objectives:** To evaluate the impact of the adaptation of ECHO on family’s ability to support their children, further adapt the network to meet unique needs of other underserved groups (e.g., Spanish speaking families) and address the evolving needs of families in a large, underserved, frontier state.

**Methods:** The ECHO for Families has been implemented yearly since 2018. For each implementation year, pre and post network self-report evaluations was collected, along with post-session evaluations. We measured satisfaction and usefulness of the network/session, knowledge change using retrospective pre/post measures, and self-reported implementation of new skills. Administrative data were used to compute impact and reach.

**Results:** 378 family members joined 52 sessions over four years; 80 families completed the evaluations. 16 of 23 counties were represented; all but two are rural/frontier communities. 90% of respondents were highly satisfied with the training. 82.6% of respondents reported increased connection to other families and professionals. 95.8% founds the sessions useful. Parents’ knowledge significantly increased, t(371)=18.22, p<.001. 92.8% of respondents reported they will be able to use skills at least monthly and 67.4% plan to use skills weekly or daily. Moreover, 91.3% were moderately confident in abilities to use these new skills.

**Conclusions:** The ECHO model was successfully modified to be used with families. While some considerations must be made to manage confidentiality issues, fidelity to the model was maintained. Families who participated were significantly more knowledgeable about basic interventions for ASD, able to implement some tools independently and adapt practices to meet the current and evolving needs. ECHO for Families can be quickly adapted to meet the changing needs of families, including to the COVID-19 pandemic. ECHO for Families is an important tool to improve family outcomes in extremely remote communities with limited access to other services.

**223.004 (Panel Discussion)** Family Echo: Autism - Adapting the Project Echo Model for Families

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**Background:** Families of children with autism are key members of care teams and often the primary coordinators for their child’s treatment. Despite calls for interdisciplinary training and collaboration across medical, education, and community systems families typically receive very little education and training in autism, care coordination or team-based care.

Family ECHO: Autism adapted the Project Extension for Community Healthcare Outcomes (Project ECHO) model to build the knowledge and confidence of families raising children and adolescents with autism. The series provides access to interdisciplinary subject matter experts from a learning health network, autism resources, resource coordinators, and community connectedness to build care and treatment knowledge of families.

**Objectives:**

- Increase self-efficacy in knowledge and confidence to care for children with autism and other developmental disabilities
• Understanding of care and treatment best practices
• Increase capacity in connecting families to resources and regional autism care networks

Methods:

Our adaptation maintained the core tenants of the Project ECHO model: case-based learning (termed case vignettes), didactic presentations, interdisciplinary hub team of subject matter experts, and building a community of learners.

Series delivered 9 topic sessions from fall 2021 through spring 2022. Series provided an open format that allowed participants to self-select Family ECHO: Autism sessions that best fit their family’s needs and modified the time of sessions to later in the day to accommodate busy life schedules of families.

Participants of the series completed registration and satisfaction surveys and were provided the opportunity to provide input to series offerings to ensure reflection of current care and treatment needs. The hub was a balance of psychology, neuropsychologists, social work, developmental and behavioral pediatrics, marriage and family therapist, parent partner, sibling advocate, self-advocate and leadership from the Autism Care Network.

Results:

Family ECHO: Autism series topics included anxiety, irritability and challenging behavior, ADHD, family support and more. Series results show 5357 total registrations, yielding 2287 total attendances across 9 sessions. Average number of participants per session equaled 254. Participants attended from 47 US States and 22 countries such as Canada, Argentina, Ethiopia, Japan and many others.

Survey data collected from over 850 participants demonstrates high satisfaction in knowledge gains, acquiring best practices, idea generation and meaningful discussion from case vignettes.

Conclusions:

The mission of Project ECHO to democratize implementation of best practices for healthcare and education is a promising approach to address caregiver knowledge, skills, and confidence.

Preliminary evaluations suggested that families found the information useful, reliable, and relevant. They also reported learning best practices related to team-based autism care and felt their knowledge and ability to care for their child with autism benefited from participation in this adaptation of Project ECHO.

The series is not only maintaining but is growing, with future topics chosen based on participant input. We anticipate continuing to expand the national and international reach of Family ECHO: Autism to support families in the journey toward building optimal quality of life and improving care for children with autism.

ORAL SESSION — FAMILY ISSUES AND STAKEHOLDER EXPERIENCES

301 - Ethical, Social & Legal Implications of Autism Genetics & Neuroscience

Moderator: Paul Wang, Simons Foundation

301.001 (Oral) Parent Attitudes Towards Data Sharing in Developmental Science


Background: The power of data sharing in developmental research is receiving increasing recognition. Data sharing can accelerate the pace of discovery, link researchers with high quality analytic expertise to researchers with large datasets and democratise the research landscape. However, there are significant privacy and security concerns as well as conceptual and ethical considerations. These are particularly acute for developmental science, since infants cannot consent for themselves. It is essential that as we move forward into an era of data openness that we adequately incorporate the views of stakeholder communities, such as those of parents, in our decision-making processes.
Objectives: To establish parent attitudes towards data sharing in developmental science.

Methods: We conducted a comprehensive survey of the opinions of 195 parents on data sharing in developmental science. The sample comprised 122 parents of typically developing children (henceforth TD group) and 73 parents of a child with one or more neurodevelopmental condition (henceforth NDC group). Participants were recruited from Birkbeck Babylab database and Birkbeck Babylab social media. The survey was hosted on the Gorilla platform. Statistical analysis was conducted using SPSS (IMB version 26.0.0.0). Non-parametric tests were used due to the ordinal and categorical nature of the data. Answers to open questions were explored using Leximancer Desktop 5.0.

Results:

Who to share data with? 96.4% of the sample would be happy to share their child’s data with universities and research centres, while only 16.9% of participants would be happy to share their child's data with private companies and industry. The NDC group were more willing than the TD group to share their child’s data with GP's and hospitals, private companies and industry, and charities (p ≤ 0.000).

How is the data shared? Whole-group results showed that parents were generally supportive of curated (66.7%) but not open (33.3%) data sharing. Parents overwhelmingly supported nuanced consenting models in which preferences for particular types of sharing could be changed over time.

What data is shared? A significant difference was found between the type of biological data and parents' willingness to donate and share this as per Friedman’s χ²(6) = 265.149, (p ≤ .000). Parents were significantly less comfortable to share DNA than other biological measures e.g., hormone levels, non-invasive brain imaging and eye-tracking. In every case, the NDC group were more willing to share each type of data than the TD group (p ≤ .00).

Why is the data shared? Parents across groups frequently used terms like “better”, “faster” and “peer review”, suggesting that they hoped data sharing would improve research speed and quality. Parents from the NDC group frequently used terms like “helps” and “others”, suggesting a sense of altruism towards others in their community.

Conclusions: The field should create repositories that implement dynamic consent and mechanisms for curated sharing that allow consideration of the scientific questions addressed. Better communication and outreach are required to build trust in data sharing. Advanced analytic methods will be required to understand the impact of selective sharing on reproducibility and representativeness of datasets.

Background: Genetic research and clinical genetic testing (CGT) in autism spectrum disorder (ASD) concern families with autistic children and autistic adults. However, there is still limited information about the opinions and attitudes toward research and CGT in ASD, especially from autistic adolescents and adults. Expanding the research to include the whole community is important, as autistic adults can serve as a proxy for autistic children, who are typically too young to consent to genetic testing/research.

Objectives: We aimed to survey and compare attitudes and perceptions toward the etiology, CGT, and genetic research specific to ASD and general health conditions, among parents of autistic children and autistic adolescents and adults through a community survey.

Methods: Two online questionnaires, one targeted at parents with at least one autistic child and one targeted at autistic adolescents (from 15 years) and adults, were conducted with over 50 questions on the issues. We performed both quantitative and qualitative analyses on the received answers from 868 parents of autistic children (parent group, 94.7% women) and 213 autistic adolescents or adults (ASD group, 74.6% women) to analyze the overall opinions, similarities, and differences between the two respondent groups.

Results: Approximately 85% of the respondents in both groups indicated that inherited factors contribute to a very high degree or a high degree to ASD. Although more than 50% were positive about undergoing CGT after ASD diagnosis in both respondent groups, the ASD group had significantly fewer positive responses (p = 0.03). In both groups, the respondents were most positive about CGT if it could lead to personalized interventions, but the parents were significantly more positive (p < 0.001). Similarly, most of the respondents were positive about genetic research in ASD. However, autistic adults and adolescents were concerned either to a very high or high extent (61.1%, n=130) that genetic research results could be used for the wrong purposes. Based on our thematic analyses of the open-ended answers, the concerns clustered within six themes, including eradicating autism from society, increased discrimination, and exclusion from society.
Conclusions: We show support and interest in genetic research and CGT in autism from parent and autistic respondent groups; however, there are significant differences between the groups, with autistic adults being more negative to both. It is important to highlight the opinions of autistic adults on the issues and work together to address the concerns raised.

301.003 (Oral) Ethics Along the Path to Translation of Neuroscience Findings in Autism


Background:

Each step in the translation of clinical neuroscience findings into therapies that benefit children with autism raises pressing ethical questions, ranging from optimizing informed consent for biospecimen donation to helping families evaluate risks and benefits prior to enrolling in a clinical trial. Active engagement between ethicists, scientists, clinicians, and communities is critical to address these questions. This presentation will discuss conceptual and empirical ethics work that has been developed alongside basic and clinical neuroscience efforts to understand mechanism, prediction, and treatment for autism spectrum disorder.

Objectives:

To outline ethical challenges related to biospecimen donation, presymptomatic prediction, and clinical trial design and propose solutions that incorporate the perspectives of impacted stakeholders, including individuals with autism and their families.

Methods:

Empirical data collection included (A) semi-structured qualitative interviews with parents (n = 30) of autistic children and autistic adults (n = 2) who donated biospecimens for brain organoid research; and (B) interviews with parents of infants at high likelihood of developing autism (n = 30) and parents of infants at low likelihood (n = 25) to understand attitudes towards prediction of autism in infancy and potential designs of presymptomatic intervention trials. Conceptual methods included applying ethical frameworks developed in the context of pediatric genetics to the autism research context.

Results:

Major themes emerging from qualitative interviews will be discussed alongside implications for future research and translation. (A) In interviews related to biospecimen donation for brain organoid research, participants emphasized the importance of transparency during initial informed consent, obtaining additional consent for continued use of samples when children reach age of majority, and desire to receive ongoing updates on progress from the research team. (B) In interviews related to presymptomatic prediction and intervention, most participants stated an interest in obtaining a predictive diagnosis for their infant, described their anticipated reactions to learning a predictive result was wrong, and stated a willingness to participate in a presymptomatic intervention trial if they had no safety concerns and were able to simultaneously pursue services in their communities.

Conclusions:

Real-time ethics engagement can enable elicitation and incorporation of the perspectives of those most likely to be impacted by the process of neuroscience translation. Anticipating the ethical and social impacts of new advances in neuroscience can maximize the benefits of resulting therapies and avoid inadvertent harm to families and communities.

301.004 (Oral) Return of Genetic Results in the Largest Recontactable Cohort of Individuals with Autism


Background: SPARK (SPARKforAutism.org) is the largest recontactable cohort of people with autism. As part of SPARK’s partnership with participants, SPARK returns results, including genetic results that significantly contributed to autism.
Objectives: To characterize individuals who have received genetic results in SPARK and analyze differences between those with and without genetic results.

Methods: Returnable results are likely pathogenic (LP) and pathogenic (P) (ACMG criteria) variants from a predefined list of genes and copy number variants that meet ClinGen or DDGP standards of “definitive” and “strong” for autism, intellectual disability and neurodevelopmental conditions. All returned variants are confirmed in a clinical laboratory.

Results: We have identified 1,616 returnable results in 21,264 people with autism (7.6%). Of results with known inheritance, 78% occurred de novo and 22% were inherited. 61% of genetic results are single nucleotide variants (SNVs)/indels with the remainder being chromosomal abnormalities or copy number variants (CNVs). There was no significant difference in the odds of a CNV or SNV/indel being inherited.

The results show significant heterogeneity, with 437 unique loci and 18% seen only once or twice. The most common CNV is the 16p11.2 deletion in 4.0% of results, and the most frequent gene is SHANK3 in 2.0%.

For 40% of participants with autism, SPARK has DNA from both parents. Diagnostic yield in these offspring is 9%. The odds of identifying a result for return is 1.4-fold higher if both parents submitted samples (p=3.1E-10).

105 participants inherited a P/LP SNV and 88 inherited a CNV from 178 parents. Of the 145 transmitting parents with phenotypic data, 4.8 percent reported an autism diagnosis and approximately one third reported a neuropsychiatric symptom. This is significantly higher (OR 1.9, p=0.003) than the remaining parents in SPARK. The neuropsychiatric condition most correlated with the odds of transmitting an autism variant is ADHD.

The strongest predictors of a genetic result in people with autism are motor delay (OR 3.1, p=6.8E-76), congenital anomalies (OR 2.8, p=2.7E-23), cognitive impairment (2.7 E7.9E-73) and seizures (OR 2.6, p=2.2E-25). The odds of having an autism-related genetic result in participants with all of these features are 5 times higher than in participants without all of these features (p=5.6E-8). However, 21% of participants with results reported none of the above features.

Being a female with autism increases the odds of having an autism-related genetic result by 1.6-fold (p=2.1E-17). By contrast, ADHD was not predictive and endorsing depression slightly lowered (OR 0.72, p=0.0006) the likelihood of having an autism-related genetic result.

The study showed that participants who had received some form of genetic testing were more likely to have a result in SPARK (OR 2.63, p=2.21 E-65). However, participants who suspected there was a genetic cause were no more likely to receive a result than those who did not.

Conclusions: Our results demonstrate that it is possible to return genetic results to hundreds of individuals at scale. Although syndromic features increase the probability of finding a genetic result, the findings are not restricted to individuals with these features.
The LEANS project resources are designed to facilitate whole-class teaching about neurodiversity as an “umbrella” concept to children age 8-11 years, in order to increase pupil and teacher understanding of differences in learning, interaction, and sensory experiences, and to promote inclusive actions and attitudes. Unlike psychoeducation programmes focusing on autistic/neurodivergent children only, or teacher training about specific diagnoses, LEANS is not an intervention for perceived problems or deficits. It upskills all pupils and staff members through teacher-delivered, whole-class work focused on understanding and acceptance.

**Objectives:** To assess whether LEANS programme was feasible, acceptable, and safe when teacher-delivered in real mainstream primary classrooms. Assess impacts on pupils’ neurodiversity knowledge, and their self-reported attitudes and intended actions at school.

**Methods:** Seven classroom across four mainstream Scottish primaries volunteered to deliver the LEANS programme (~140 children exposed to programme, Aug-Dec 2021). Using opt-in family recruitment, 62 children’s LEANS measures and demographics were then shared with researchers (female=36, mean age 9.84 years). 17.74% of participants had reported additional support needs (e.g. formal diagnoses such as autism, undiagnosed challenges).

Teachers administered two bespoke measures to their classes before and after delivering LEANS: attitudes/actions, and neurodiversity vocabulary and knowledge. We collected additional qualitative data from free-response questions, follow-up interviews (child participant subset) and written “teacher diaries” about the experience of delivering LEANS.

**Results:** Post-test multiple-choice measure scores illustrated that participating pupils could successfully demonstrate knowledge of the neurodiversity concepts contained in LEANS, and expressed more inclusive and accepting attitudes and intended actions following LEANS participation (both p <.001). Quantitative analyses were pre-registered: https://osf.io/38jrh

Analyses of teacher diaries and child qualitative data consistently supported these quantitative findings, providing specific, personal examples of changed knowledge and actions. They provided actionable feedback on resource revision (e.g. issues with length of some items). No data or school communications reported harms resulting from LEANS.

**Conclusions:** These results are highly encouraging, especially given Covid-19 disruption during the evaluation period. Based on child knowledge at post-test and significant changes in attitudes and intended actions, LEANS appears to be a successful tool for introducing neurodiversity concepts in primary schools. It offers a basis for ongoing classroom discussion and potentially facilitating longer-term change, though follow-up data is needed. Post-evaluation, the LEANS resources were revised to incorporate teacher and pupil feedback, and were released as a free download in June 2022, with delivery commencing in some schools for the 2022-2023 school year.
Autistic participants \(n = 5\) were interviewed as a mock-suspect implicated in a fictional crime by a real-life police investigator \(n = 5\), whilst accompanied by a forensic support worker \(n = 5\) in a police custody interviewing suite. Investigators were provided with an overview of the mock-offence and ‘incriminating evidence’ against the mock-suspect and were instructed to conduct the interview as if part of a genuine police investigation. All participants were subsequently interviewed by the lead researcher about their experience of the mock-suspect interview and their perspectives on police interviewing practice more broadly. Police officers and support workers also drew upon their real-life experiences of interviews with autistic suspects. All interviews were analysed using qualitative thematic analysis to identify thematic patterns in the data address relevant to the study research questions. We then used a socio-ecological framework to examine interrelated individual, interpersonal and environmental factors that influence an autistic persons’ experience during a police suspect interview.

Results:

We identified three main themes across participants’ interviews: (1) Psychological, emotional, and socio-cognitive needs of autistic suspects; (2) Supporting an interview account with an autistic suspect; and (3) Perceptions of credibility, behaviour, and power. Using these themes and associated sub-themes, we produced a conceptual socio-ecological framework to demonstrate how an autistic person’s experience of a police suspect interview is influenced by a range of interconnected factors at individual (e.g., sensory experience); interpersonal (e.g., neurotypical perceptions of behaviour) and environmental (e.g., custody security) levels.

Conclusions:

Autistic adults, investigators, and support staff are presented with individual, interpersonal, and environmental barriers to engaging effectively in police suspect interviews. Greater attention should therefore be paid to providing appropriate support to autistic adults whilst in custody prior to, during, and following a police suspect interview. We provide a number of practical adaptations that can be made to better support an autistic person when interviewed as a police suspect.

307.003 (Oral) “It’s Really Complicated”: Engaging Key Stakeholders to Inform a Novel Parent-Led Sexual Health Education Program for Autistic Youth

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Background: There is a paucity of research on sexual health education for autistic individuals, despite a clear need for such work. Youth with autism spectrum disorder (ASD) often experience challenges navigating puberty, sexuality, and relationship changes that take place during adolescence. This can result in less perceived and actual knowledge of sexual health topics (Hannah & Stagg, 2016) and an increased risk of problematic sexual behaviors in adulthood (Stokes et al., 2007). Parents may be a useful source of sexual health information for their children with ASD. However, few evidence-based programs exist to support parents in navigating this role. Thus, there is a need for the development of such programs, particularly those incorporating the lived experiences of key stakeholders.

Objectives: The present qualitative investigation aimed to determine the sexual health education needs of autistic youth and to inform a novel, parent-led sexual health education program using data gathered through focus groups with parents and self-advocates.

Methods: Autistic self-advocates \((N=4; \text{ages } 28-57)\) and parents \((N=4)\) of 11- to 18-year-old autistic youth were recruited through local advocacy groups to participate in two rounds of focus groups (4 total groups). Licensed clinical psychologists facilitated all groups via teleconferencing with co-facilitation from an autistic self-advocate for the self-advocate groups. Groups were audio recorded and transcribed verbatim. The first round of focus groups (120-minutes each) was held prior to the start of a pilot cohort of a novel, parent-led sexual health education program. Stakeholders were asked to share their subjective experiences with sexual health education and provide feedback on an overview of proposed program content. Preliminary findings were used to tailor program implementation. The second round of focus groups (90-minutes each) was held after completion of the eight-week program. Programmatic changes based on stakeholder feedback were discussed and member checking confirmed themes derived from initial focus groups. The research team conducted rapid qualitative analysis on all four group transcripts. Focus group summaries were consolidated into structured matrices by participant type to identify common barriers, facilitators, and implementation recommendations.

Results: Synthesized data across both rounds of self-advocate and caregiver focus groups revealed four overarching themes regarding the sexual health education needs of youth with ASD: “Empower parents as educators,” “Individualize supports and education,” “Prioritize safety,” and “Consider cultural and intersecting identities.” See Table 1 for subthemes and illustrative quotes.

Conclusions: General sexual health education is insufficient for youth with ASD, and resources specific to this population are needed. Parents are a primary mechanism for providing this education and would likely benefit from participating in a program that considers the unique needs of autistic youth, the importance of safety, and the influence of other aspects of identity. Future research on the implementation of such a program is needed.
Racial and Ethnic Group Differences in Service Utilization in Children with Autism Spectrum Disorder: The Role of Parental Stigma


Background: Racial and ethnic disparities in service utilization among children with autism spectrum disorders (ASD) have been widely documented (e.g., Broder-Fingert et al., 2013); however, the factors driving these disparities are less well understood. ASD-related parental stigma may play a role (Rivera-Figueroa, Marfo & Eigsti, 2022). Parents from racial/ethnic minoritized (REM) and other marginalized backgrounds may experience more stigma, due to their child’s ASD, and their membership in a marginalized group themselves; both factors may impede their access to needed resources.

Objectives: The present study quantifies stigma among a large, diverse sample of US-based parents of children with ASD and measures the impact of stigma on service utilization. Stigma was defined multidimensionally as community stigma (negative attitudes of community members), affiliate stigma (internalization of negative views), stigma salience (intensity and automaticity of negative thoughts), and stigma as a treatment barrier (stigma’s impact on treatment engagement).

Methods: A sample of 826 English-proficient parents were recruited via the Simons Foundation Autism Research Initiative (SPARK Consortium, 2018) and completed an online survey. Parents received $25 for study participation. In addition to measures of stigma, parents responded to questions about discriminatory experiences, satisfaction with their ASD provider, and sociocultural values. Across racial/ethnic groups, participants differed in socioeconomic status (SES), the number of children with ASD in the household, and target child’s age (Table 1); as such, analyses controlled for parental education, financial stability, child age, and number of children with ASD.

Results: Findings revealed significant REM group differences in reported family stigma, service utilization (number of recommended services that were unavailable or only partially used), and perception of unmet needs (i.e., receipt of necessary treatments). Asian and White parents reported significantly more affiliate stigma than other groups; White parents reported more stigma salience than Latinx and Multiracial parents. Asian and Latinx parents were less likely to fully engage in recommended services, and Asian parents endorsed less service availability. Less financial stability predicted service underutilization, unavailability of services, perceptions of unmet needs, and more stigma. Higher parental education predicted more stigma. Parental stigma was related to reduced treatment engagement across the sample, although associations were small; this relationship significantly differed across REM groups and was stronger for Asian, Black, and Multiracial compared to Latinx and White parents. These results suggest greater susceptibility to the adverse effects of stigma on service utilization for Asian, Black, and Multiracial families.

Conclusions: Families from diverse backgrounds have disparate treatment needs. Results suggest that adverse effects of ASD-related stigma are contingent on sociodemographic factors, including race/ethnicity, and that parents from marginalized backgrounds may be more susceptible to the negative impacts of stigma on healthcare utilization. Intersectional methods recognizing the diverse impacts of race/ethnicity, SES, and their combination, illuminate the interacting dimensions that exacerbate ASD healthcare disparities. Study limitations include reduced representation from parents of certain marginalized backgrounds (e.g., less English proficiency and SES), who may be more likely to experience stigma and barriers to services. Overall, results indicate that racial and ethnic disparities are pervasive and impact even well-resourced parents.
Background:

Autism is represented in every racial, ethnic, cultural, and linguistic group; however historically marginalized and minoritized children experience unequal access to timely identification, diagnosis, and services (Magaña et al. 2017; Mandell et al. 2007; Stahmer et al. 2019). Delays in early intervention access narrow this important window of opportunity for intervention and skill development. Disparities in autism identification and access to services are pervasive equity issues affecting historically marginalized and minoritized families (Stahmer et al. 2019); these patterns may be strongly influenced by a lack of culturally responsive and patient-centered care within service systems. While the majority of caregiver engagement research focuses on barriers and facilitators to caregiver empowerment, few studies systematically measure the ecosystem of knowledge and resources embedded in the social networks of caregivers of autistic children that can help them locate autism providers and successfully navigate the autism service system. We used a Community Partnered Participatory Research (CPPR) approach (Jones et al. 2009) to develop a program, called Mind the Gap (MTG) that engages peer navigators to connect caregivers with service providers and help them grow their services network for the child on the autism spectrum, post-diagnosis.

Objectives: The current study utilized a randomized control trial (RCT) to compare two conditions: 1) MTG Program with peer navigation and accompanying resources and activities (called MTG Program) to 2) a MTG resource only group (called MTG Resources-only) to examine program impact on time to first service (primary outcome) and caregiver support and family empowerment (secondary outcomes).

Methods: We compared MTG Program (n=53) to MTG Resources-only (n=59) in a four-site randomized controlled trial in racially and ethnically diverse, under-resourced communities. Our primary outcome was caregiver service access over time and our secondary outcomes were caregiver reported family and professional support networks and family, community, and services empowerment.

Results: In our intent-to-treat analysis, there were no treatment differences in the time to first new service (Z=-1.019, p=0.308, cox PH). There were also no treatment differences in uptake of new services ($\chi^2 = 0.03$, p=0.87). There was a significant change in professional network size for caregivers in the full MTG program group, as compared with those in the comparison group (see Figure 1). The MTG Program group increased their professional network size more than the comparison group ($F(1.91)=3.71$, p=0.05) from baseline to exit. For caregivers in the MTG Program group, there was a significant overall improvement in average service empowerment from pre to post (p=0.001).

Conclusions: While results suggest that MTG Program with peer navigator support did not significantly impact the time to service access, the MTG Program did improve caregiver connections to professional supporters and caregiver service empowerment: key factors likely to impact the quality and quantity of service provisions for children on the autism spectrum. More research is needed to determine the potentially cascading effects of increased connections and empowerment with service professionals on later management and support of children on the autism spectrum, as they progress through schooling and later the transition to adulthood.

317.002  (Oral) The Effectiveness of Acceptance and Commitment Training (ACT) for Family Caregivers of Autistic People or People with Other Neurodevelopmental Disabilities

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Background: Family caregivers (hereafter referred to as caregivers) of autistic people and people with other neurodevelopmental disabilities often experience high levels of distress (Marquis et al., 2020). Interventions targeting parenting skills or providing strategies for caregivers to implement with their family members are increasingly available, but psychological interventions directly targeting caregiver mental health are less common. One intervention that directly targets the mental health of the caregiver is Acceptance and Commitment Training (ACT). ACT is a therapeutic approach incorporating cognitive behavioural strategies with an emphasis on acceptance, value-driven action and psychological flexibility. Our ACT model for caregivers of people with neurodevelopmental disabilities is not only co-designed by caregivers and clinicians, but also delivered in partnership with them (Fung et al., 2021)

Objectives: We sought to examine predictors of psychological wellbeing among caregivers of children, youth and adults with neurodevelopmental conditions, including autism, intellectual disability, and fetal alcohol spectrum disorders, who participated in our group-based ACT intervention. Findings provide insight into levels of caregiver depression and stress, as well as the change over time while attending the group.

Methods: We report on data from 96 caregiver participants, including 65 caregivers of autistic people. We examined the relationship between caregiver demographic variables (e.g., age, marital status), child demographic variables (age, diagnostic group), and depression and stress, as measured by the Depression, Anxiety and Stress Scale (DASS; Lovibond & Lovibond, 1995). We also examined psychological variables, including cognitive flexibility using the Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014). Caregiver
workshop participants completed a survey with these measures before the workshop (time 1), immediately after the workshop (time 2) and at 3 month follow-up (time 3).

**Results:** Depression scores across the different child diagnostic groups showed a significant decrease from time 1 to time 2 on paired sample t-tests ($p < 0.001$) and remained lower at time 3 ($p < 0.001$). Stress scores also showed significant decreases at both time points (both $p < 0.001$). At times 1, 2 and 3, no differences were observed between the diagnostic groups on depression or stress scores. Improvements in depression and stress occurred regardless of child or caregiver age, or marital status. K-means cluster analyses specifying 3 groups revealed that there was a group of caregivers that experienced significant improvement ($n = 5$), a group with moderate improvement ($n = 41$) and a group with little improvement ($n = 41$). Cognitive fusion scores at time 1 were a significant predictor of group membership (i.e., more fusion was associated with the poorer outcome group on the DASS; $p = 0.029$).

**Conclusions:** Results of this study demonstrate the effectiveness of ACT for caregivers of people with neurodevelopmental disabilities. These effects are present for caregivers of autistic people, as well as those with other neurodevelopmental conditions. In addition, the lack of significant differences among specific caregiver demographic variables suggest that psychological variables (e.g., cognitive fusion) rather than demographic variables (e.g., age of caregiver or child) predict success in the group. Implications of the predictors of success will be discussed.

**317.003 (Oral) Family-Centered Care and Quality of Life in Caregivers of Toddlers with Confirmed or Likely Autism**


**Background:**

Caregivers of autistic children face unique demands at many social-ecological levels (individual, family, and within the healthcare system). These demands may differentially impact quality of life (QoL) for caregivers of toddlers with likely or confirmed autism, compared to caregivers of children with other developmental concerns or parents of children with no current concerns (Russa et al., 2015). Further, having a supportive experience at the system level (e.g., perceiving the care a primary care provider (PCP) provides to be family-centered; Boncinelli et al., 2015), may ameliorate individual- or family-level stressors that caregivers experience.

**Objectives:**

The objectives of the current study were to: (1) Examine the extent to which three contextual levels of determinants (demographic, family, and system) predict caregiver QoL; and 2) Investigate whether receiving more family-centered care improves the relation between parenting stress and QoL, for caregivers of children with autism/autism concerns, developmental delay (DD) concerns, and no concerns.

**Methods:**

Our sample ($n=484$) comprised three groups: caregivers of children with autism/autism concerns ($n=119$), caregivers of children with other developmental concerns ($n=101$), and caregivers of children with no concerns ($n=264$). Children were 17 to 42 months old ($M=23.35$; $SD=5.01$) when their caregivers filled out a demographic questionnaire, the Parenting Stress Index (PSI-SF), the Measure of Processes of Care (MPOC-20)—which assesses the degree of family-centered care they perceive from their primary care provider (PCP)—and finally, the WHO Quality of Life (QoL) measure (WHOQOL-BREF). A hierarchical linear regression assessed the additive effect of demographic (child age, caregiver employment status, income, and number of other children), caregiver (parenting stress), and system (family-centered care) level factors on QoL, and whether there were interactions with concerns group.

**Results:**

Having a younger child ($b=-.16$), higher income ($b=.30$), lower parenting stress ($b=-.59$, $R^2$ change=$.04$, $p<.001$), and more experiences of family-centered care ($b=.23$, $R^2$ change=$.36$, $p<.001$) all predicted greater caregiver QoL regardless of concerns group, $p<.001$. Negative effects of parenting stress on QoL were stronger for caregivers of children with autism/autism concerns ($b=-.80$, $r=-.80$) than for parents of children with developmental ($b=-.16$, $r=-.64$) or no concerns ($b=.15$, $r=.65$), $R^2$ change=$.02$, $p<.001$ (Figure 1). This effect was not ameliorated by receiving family-centered care ($b=.05$, $p=.15$). However, higher reported levels of family-centered care predicted improved QoL equally well for all groups ($b=-.23$) (Figure 2).

**Conclusions:**

Caregivers of children with autism or autism concerns perceive their PCP to be providing family-centered care at similar levels to other caregivers, which is encouraging. Receiving family-centered care does not seem to reduce parenting stress. Future research is needed to determine how to provide additional support to caregivers with lower QoL, particularly caregivers who are experiencing income or...
parenting related stress and low levels of family-centered care. The role of parenting burnout (Aktan et al., 2020) on family-centered care and QoL should be explored. Caregiver QoL is especially important to support across service settings (e.g., medical, early intervention) during the birth-to-three period, when the identification of autism and the process of accessing services are new experiences for caregivers.

317.004  (Oral) Best FACES Forward: Outcomes of an Advocacy Intervention for African American Parents Raising Autistic Youth

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Background:

The autism diagnosis disparity between Black and non-Black children has recently narrowed, reducing chronic underrepresentation (e.g., Maenner et al., 2020; Nevison & Zahorodny, 2019). However, Black children are still diagnosed later than their white peers and are often presumed to have other disabilities first (e.g., intellectual disability; Constantino et al., 2020). Given these disparities, Black autistic youth and their families experience unique barriers to accessing autism-related services and supports compared to their non-Black peers, such as lack of social support and communal stigma. One way to increase access to and use of autism-related services is by improving parents' capacity to advocate for their children (e.g., Dababnah et al., 2018; 2021; Pearson, et al. 2021). While parents raising children with disabilities have historically been the strongest advocates for the strengths and needs of their children, advocacy groups typically comprised middle-class White parents (Turnbull et al., 2010). Simultaneously, Black parents raising autistic youth conveyed they did not possess adequate capacity to advocate for autism-related services (e.g., Dababnah et al., 2021; Jamison et al., 2017; Pearson, Meadan et al., 2020).

Objectives:

This study measured the outcomes of the FACES training on the advocacy capacity among a larger sample of Black parents raising autistic youth, using a quasi-experimental design. Our research questions were: (1) Does the FACES program increase empowerment and perceptions of advocacy ability in Black parents raising autistic youth? (2) Does the FACES program increase parents’ understanding of autism, social communication, and behavior strategies? (3) Does the FACES program affect parent-professional communication?

Methods:

We used a quasi-experimental research design that compared pretest and posttest measures for 16 Black parents raising autistic youth. Intervention participants demonstrated increases in family empowerment, school communication, and perceptions of advocacy ability. Our small sample size and the missing data dictated the use of nonparametric statistics in analyses. We conducted a Wilcoxon Signed-Rank Test to evaluate the effective difference between pretest and posttest median scores for both groups for each of the six measures.

Results:

Findings offer emergent evidence of advocacy programs for Black families raising autistic youth. Following FACES, intervention participants had statistically significantly greater scores on family empowerment, and parent-professional communication, but not on autism knowledge. In addition, social validity data conveyed high satisfaction with the intervention.

Conclusions:

We draw four conclusions from these results. First, the study offers further evidence for the FACES training. Second, parents’ perceived advocacy capacity and overall empowerment increased despite no changes in their knowledge of autism characteristics and social communication/behavior strategies. Third, implementation fidelity was negatively impacted by participants’ desire to continue discussing religion and coping in Session Three. Religion (and the Black Church specifically) continues to hold a prominent role in the Black community (Avent Harris, 2019). Fourth, experimental group participants showed tenable gains in school communication, but not on family-professional partnership. Our findings extend the pilot study (Authors, 2021), and contribute exploratory evidence suggesting the positive effects of FACES on parental advocacy capacity.

POSTER SESSION — FAMILY ISSUES AND STAKEHOLDER EXPERIENCES

402 - Family Issues and Stakeholder Experiences I

402.075  (Poster) "A System That Wasn’t Really Optimized for Me": Autistic University Students’ Access to Information

Background: Autistic people are increasingly pursuing higher education (Cox, 2017), though lower graduation rates suggest they are experiencing difficulty. Potentially contributing to this difficulty is that universities expect students to enter with and acquire both explicit and implicit institution-related knowledge (Lessky et al., 2021). This institution-related knowledge allows students to benefit from resources and support. But accessing this knowledge requires a combination of formal and informal information behavior: searching and seeking behaviors used to resolve one’s need for information (Bates, 2010). Both individual and interactional (i.e., the combination of two interactants’) characteristics may influence autistic university students’ information behavior and, subsequently, their opportunities to acquire information about resources and support. However, institutional policies and practices also likely influence these opportunities.

Objectives: Our aim was to gain insight into the factors that influence autistic university students’ access to information about resources and opportunities. Despite calls across disciplines to investigate autistic people’s access to information (e.g., Byrne, 2020; Gibson & Hanson-Baldauf, 2019), we currently have an insufficient understanding of the individual, interactional, and institutional factors that impede autistic students’ full access to higher education.

Methods: We interviewed 14 autistic students (mean age = 20.86, 35.71% male, 35.71% female, 28.57% non-binary, 71.43% White) about their experiences at a large, public university. Twelve participants spoke with us in individual or group interviews and two completed text-based interviews. We used Reflexive Thematic Analysis (Braun & Clarke, 2006; 2022) to deductively and inductively develop themes that were informed by the literature and by the knowledge of our neurodiverse research team.

Results: We constructed two themes relating to autistic students’ ability to access information about opportunities and resources. The first, "Navigating the interactions required to acquire information is challenging," focuses on participants’ accounts of difficulty acquiring information from other people. Participants often identified individual autistic characteristics as barriers to accessing information about resources and opportunities, particularly when this information access was socially mediated. We considered their experiences through a reciprocal framework (Milton, 2012), as the characteristics they identified as causing difficulty exist in inherently interactive contexts. The second theme, "Access to Information is Limited by University Expectations," examines how the university structures information access and what these policies and practices imply about the university’s expected student. We extended the first theme’s focus on misalignment by situating participants’ experiences in the context of institutional-level expectations. Identifying how universities conceptualize the “expected” university student (Koutsouris et al., 2021) as neurotypical and non-disabled provides insight into the barriers enacted by the policies and practices stemming from these expectations.

Conclusions: When their informational needs go unmet, autistic students are unlikely to be able to access resources and support that could facilitate their success (Cage & Howes, 2020). The experiences participants shared with us spanned multiple domains of university life, indicating that the need for change extends beyond the academic space. Only through understanding how higher education systems fail to support autistic university students can we move towards reshaping the systems that further marginalize this historically excluded population.

Background: The Developmental Disabilities Assistance and Bill of Rights Act of 2000 (DD Act; Public Law 106-402, 106th Congress) ensures that individuals with developmental disabilities (IWDD), including autistic individuals, and their families participate in the design of and have access to needed community services, individualized supports, and assistance that promote self-determination, independence, productivity, and integration and inclusion in all facets of community life. State Councils on Developmental Disabilities (SCDD) work to support autistic university students can we move towards reshaping the systems that further marginalize this historically excluded population.

Objectives: Given the call for increased partnership between IWDD and stakeholders, researchers, and service systems (Crimmins et al., 2019; Poulsen et al., 2022), this study aims to leverage data collected by the California SCDD to summarize and quantify stakeholder priorities for state policies.

Methods: Participants (n = 99) included family members (48.5%), community members (23.2%), IWDD (i.e., self-advocates; 14.1%), and professionals (14.1%) across California. As part of the Bill Idea Contest, participants completed a survey and responded to the question “What problem do you hope to solve?” in Fall 2021. Using an inductive analysis approach, responses were tabulated and coded under problem domains and subdomains that emerged (Wertz, 2011). To ensure consistency across coders, 20% of responses were double coded.
and indicated acceptable reliability (domain: 90%; subdomain 75%); disagreements were discussed to achieve consensus across all coders. Frequencies were run to determine top priorities.

**Results:** A total of 99 submissions were received. The following problem domains were identified (Figure 1): Priorities under the Health & Human Services domain included service access issues (e.g., barriers, lack of services) and billing practices or insurance coverage issues, and priorities under Education included legal issues and parent support issues (Table 1).

**Conclusions:** The SCDD is committed to advancing research priorities, public policy, and systems change that support IWDD, including autistic people. The present study not only supports policymakers and care systems to best align policy and practice with the priorities of IWDD and their families, but also summarizes results of a needs assessment from stakeholders’ perspectives to support future research priorities. The survey aimed to capture views from people throughout California, the state with the largest number of IWDD, and one of the highest rates of autism across the U.S. (CDC, 2021). Findings indicate top priorities to be Health & Human Services and Education. Identified priority domains and subdomains, potential solutions, and relevance to research, public policy, and practice changes that may impact autistic people and their families will be discussed.

402.077 *(Poster)* A Comparison of Autistic and Non-Autistic Adults’ Mental Health and Therapy Experiences
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**Background:**
Autistic adults are significantly more likely than non-autistic adults to have co-occurring mental health conditions such as anxiety and depression. Although best-practice guidelines for treating many mental health conditions have been established for neurotypical individuals, less research has focused on adapting these strategies for individuals with autism. Previous research has not directly compared autistic adults’ perceptions of therapy experiences to non-autistic individuals’ experiences, especially regarding specific therapeutic strategies.

**Objectives:**
The aim of the current study was to compare autistic and non-autistic adults’ symptoms of anxiety and depression, the presence of mental health conditions, and ratings of perceived helpfulness and ease of use of therapeutic strategies.

**Methods:**
The sample consisted of 296 autistic and 157 non-autistic individuals aged 21-78 (M=38.4, SD=12.4). The autistic sample was recruited online through the Simons Foundation Powering Autism Research for Knowledge (SPARK) Research Match process. The non-autistic sample was recruited through Amazon’s Mechanical Turk. Participants completed an online demographic survey, the AQ-Short, PHQ, and questions about their mental health and therapy experiences. Participants rated therapeutic strategies they had used on their perceived helpfulness (1=not at all helpful to 5=very helpful) and ease of use (1=very difficult to 5=very easy). T-tests were conducted to compare mean AQ scores and PHQ Depression and Anxiety subscale scores. Chi-square goodness of fit tests were used to compare the groups on mental health diagnoses. Wilcoxon rank-sum tests were conducted to compare ratings of therapeutic strategies.

**Results:**
Autistic participants had significantly higher scores than non-autistic participants on the AQ-Short (t=-26.10, p<.001), PHQ Anxiety (t=-10.67, p<.001) and PHQ Depression (t=-10.54, p<.001). Autistic adults were more likely to have been diagnosed with anxiety (X^2=135.02, p<.001), depression (X^2=129.83, p<.001), bipolar (X^2=28.61, p<.001), OCD (X^2=27.01, p<.001), PTSD (X^2=64.67, p<.001), and ADHD (X^2=99.96, p<.001). Thirty non-autistic (19.1%) and 263 autistic (88.9%) participants had previous therapy experiences. The groups did not differ in ratings of perceived helpfulness of exposure, breathing, progressive muscle relaxation, or behavioral activation strategies. The autism group rated cognitive (z=2.99, p=.003), mindfulness (z=2.57, p=.01), and guided imagery (z=1.99, p<.05) as less helpful than the non-autistic group. Breathing was the only strategy that the autism group rated as less easy to use (z=2.06, p=.04).

**Conclusions:**
Results highlight the significant co-occurring mental health challenges that autistic adults face in comparison to non-autistic adults. Moreover, some common strategies used in therapy may not be as helpful or as easy to use for autistic clients. Our study was limited by an imbalanced sample size, since fewer non-autistic adults had received therapy. Future research should investigate factors related to autistic adults’ differences in therapy experiences. For example, autistic adults may have unique life challenges for which cognitive strategies are
Background: Caregiving challenges often persist and evolve across the life course for families of autistic youth, with unique needs in the years immediately preceding and following the transition to adulthood. Most research on support for caregivers of autistic individuals is cross-sectional, quantitative, and focuses on caregivers of children with ASD. Further, not all family support may be equally helpful or important to caregivers as they and their loved ones on the spectrum age. An in-depth, qualitative investigation can provide rich insight into aspects of family support that are most valued by families raising an autistic youth across their transition to adulthood.

Objectives: Use a qualitative approach to 1) examine change and stability in the sources and characteristics of support most valued by caregivers of youth with autism during the transition to adulthood, 2) examine differences in valued sources and characteristics of support between caregivers of individuals of different cognitive ability (i.e., more able (MA; IQ ≥70) and less able (LA; IQ<70)).

Methods: Caregivers of 127 autistic individuals (20% female; 82% White) from an ongoing longitudinal study completed a modified version of the Family Support Scale (FSS; Bromley et al., 2004; Dunst et al., 1988) at five time points from adolescence into young adulthood (Table 1), as part of which caregivers answered the open-ended question: “Which of the above sources of social support is the most important to you? Why?”. Thematic analysis was utilized to identify themes, subthemes, and codes. Reliability (80% agreement on 20% of data) was established. All data was double-coded and discrepancies were resolved through consensus discussions.

Results: Caregivers’ partners were the most frequently valued source of support (approximately 40%) at all time points for both MA and LA groups (Table 1). The pattern of support sources over time differed between MA and LA groups. For example, only among caregivers of LA individuals, siblings showed increasing value into early adulthood.

Regarding characteristics of valued support sources, similar themes, subthemes, and codes emerged across all five time points. However, response frequencies varied across time and group (Table 2). Within the Type of Support theme, a subtheme, Instrumental Support (e.g., helping with daily tasks), was more valued than emotional support in adolescence. In contrast, Emotional Support became more highly valued than Instrumental Support during young adulthood; this pattern was particularly pronounced in the LA group. The top-rated characteristics of valued sources of support included being dependable, understanding, and providing partnership. These characteristics were relatively consistent across time and group (Table 2).

Conclusions: Using qualitative coding of open-ended responses, family support, especially from partners, emerged as a valued source of support for caregivers of autistic youth across the transition to adulthood. Factors contributing to the value of support changed over time, shifting from valuing instrumental support to emotional support, especially for caregivers of LA adults. Additionally, fine-grained analyses revealed that providing a sense of partnership and dependability throughout adolescence and young adulthood were highly important to caregivers.

Objectives: To understand the parent experience of participating in the Door 2 program and to compare/contrast it with supports received previously or currently to help manage their child’s co-occurring conditions.

Methods: Semi-structured interviews were conducted with nine mothers of daughters with an ED and autistic traits asking about their experience participating in the Door 2 program. Interpretative phenomenological analysis was used along with member checks to derive themes from the participants’ narratives.
Results: Two superordinate themes emerged from the interviews. “Taking a step back” consisted of narratives around the parent-child relationship and “We needed to do something different” consisted of narratives around support parents have received both in the past and at the present time. The recognition of both conditions (ED and autism) was emphasised as being an important component in their child’s recovery, as was the inclusion of and access to lived experience mentors.

Conclusions: While further research is needed to evaluate the effectiveness of the Door 2 program, the findings of this study suggest that it shows promise in helping families of young people with an eating disorder and autistic symptoms.

402.080 (Poster) A Scoping Review of Evidence-Based Supports on College and University Campuses for Autistic Post-Secondary Students
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Background: Navigating campus life and attaining credentials is often difficult for autistic adults, despite their considerable contributions to postsecondary campuses (Nachman et al., 2021). It has been reported that up to 80% of autistic postsecondary students do not graduate (Vanbergeijk et al., 2008); other research has reported limited implementation of autism-specific supports (Ames et al., 2022). Given a demand to better address the principles of equity, diversity, inclusion, and accessibility in higher education (Smith et al., 2021; Craig et al., 2010), research into both barriers and promising practices to support autistic students on postsecondary campuses has advanced, with an emerging trend of exploring autism-specific supports. Recognition of the need for equitable access to postsecondary education for autistic students has been coupled with a growing understanding that autistics require support in a variety of non-academic domains.

Objectives: The objective of this scoping review is to identify, map, and characterize literature that enumerates and describes supports for autistic postsecondary students.

Methods: Our scoping review was limited to peer-reviewed research published between 2012 and 2022, in these databases: Web of Science, PsycINFO, Medline, EMBASE, ERIC, Social Work Abstracts, Social Services Abstracts, and EMCARE. Aligned to Joanna Briggs Institute methodology for scoping reviews (Peters et al., 2022), we mapped existing approaches to creating accessible campuses across eight key domains of the PASS Taxonomy (Duke et al., 2017; Table 1) and a systematic review by Widman and Lopez-Reyna (2020; Table 2), in consultation with Autistic Community Partners (ACP). Four ACPs made up an expert panel of autistic individuals with postsecondary experience who acted as co-researchers, guiding the development of the review. Data extraction was completed by three independent graduate students using the data extraction tool developed by the authors (DS, HN, JC, BDR).

Results: The review included 154 articles from the US, Australia, Canada, Netherlands, Israel, Sweden, Ireland, Norway, Nigeria, Slovenia, and Belgium. Table 1 presents frequency counts for studies describing supports for autistic students as either successes or barriers in eight domains seen previously (Duke et al., 2017; Widman & Lopez-Reyna, 2020). Support and barrier categories with the three highest frequency counts were, Academic, Social, and Emotional. Success counts outnumbered barriers only in the Academic category, consistent with evidence that autistic PS students are academically well-prepared (Flegenheimer & Scherf, 2022). Social was almost evenly split, and Emotional, including counseling, generated higher counts for barriers than successes. Other categories emerged and were inductively grouped (Table 2) and from these, only Interpersonal and Participatory Action Process had predominantly success counts. Areas where barriers were predominant occurred within Sensory environments, Individualized supports, Attitude, Diagnosis, Disclosure, Intersectionality, Finance, Sexual Health/Education, and Service Navigation.

Conclusions: This review is the first to summarize both areas that have been researched and under-studied domains in the literature that contributes to successes and barriers for autistic students on postsecondary campuses. Mapping the literature in known and emerging categories indicated that broad categories of support are experienced variably by autistic students. Findings provide multiple avenues for future research.

402.081 (Poster) A Systematic Review of Assent Practices in Research That Establish Evidence-Based Practice for Autistic Individuals
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Background:
When an individual is unable to consent to participate in research (e.g., a minor), they should be given an opportunity to assent. An Institutional Review Board may waive the need for assent based on the age, maturity, and capability of the individual (FPPHS, 2018). This can introduce uncertainty for when and how researchers obtain assent for certain populations, such as autistic individuals. Autistic individuals present with differences in communication and behavior. For example, autistic individuals may not vocally communicate in ways consistent with social mores of non-autistic individuals. Autistic self-advocates have questioned the degree to which differences are dismissed as presumed incapability rather than accommodated by non-autistic people (Milton, 2012; Oliver, 2017). It is critically important that researchers document consent and assent procedures with autistic people to ensure appropriate processes are being utilized and refined over time. This is especially true considering growing concerns that interventions may differ in acceptability (Schuck et al., 2021). Instances of consent/assent, or lack thereof, may be one proxy metric of acceptability from participants’ perspectives.

Objectives:

We sought to identify how researchers report consent and assent procedures in autism intervention research used to establish evidence-based practice. We aimed to identify (a) the percentage of studies that document consent/assent procedures, (b) how assent was obtained, and (c) when assent was obtained.

Methods:

The NCAEP review is the most recent large-scale synthesis of research that establishes evidence-based practices for autistic individuals (Steinbrenner et al., 2020). We extracted intervention articles from their review to code consent and assent procedures. We coded study characteristics (publication year, design type, intervention type) and basic participant demographics. Next, we coded whether the authors explicitly documented consent/assent. In studies documenting assent, we also coded how and when assent was obtained.

Results:

We included 616 articles that utilized single-subject designs (SSD; n=1681 participants) and 178 articles that utilized group designs (n=9049). SSDs included younger participants on average ($M=2.75$) relative to group designs ($M=8.57$). While consent procedures were mentioned more frequently in group design studies, both group designs and SSDs rarely documented assent (7-17%; Table 1). Assent procedures were largely not described even when referenced (~75% not described). For studies documenting when assent occurred, it primarily was obtained prior to study onset only. There has been a small increase in the percentage of studies reporting assent in recent years concomitant with a larger number of studies being published (Figure 1).

Conclusions:

The current body of literature that establishes evidence-based practices for autistic individuals largely does not report consent and assent practices within the published manuscript. There may be several reasons for limited reporting practices, including lack of motivation to report such, journal restrictions (e.g., page limits), waiving assent due to actual or perceived incapability, and/or using retrospective data from clinical practice. In this presentation, we argue the importance of carefully selecting and reporting assent practices and outcomes in the context of autism research and practice. We also discuss challenges and implications of selecting different assent procedures and timeframes.

402.082 (Poster) A Systematic Review of Community-Academic Partnership Quality in Autism Intervention Research

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Background:

There is minimal research on the quality of community-academic partnerships in studies of interventions for autistic children. However, both community members and researchers have emphasized the importance of building high quality community engagement in autism intervention research to improve implementation outcomes (Carrington et al., 2016; den Houting et al., 2020; Fletcher-Watson et al., 2019). We are completing the first systematic review of reported community-academic partnership quality in research on psychosocial and educational interventions for autistic children and their families. We will explore associations between reported partnership quality and reported implementation outcomes.

Objectives:

1) Systematically evaluate the quality of reported community-academic partnerships in research on psychosocial and educational interventions for autistic children and their families.
2) Explore associations between quality of reported community-academic partnerships in research on psychosocial and educational interventions for autistic children and their families and implementation outcomes.

Methods:

Search and Inclusion:

We searched eight databases (APA PsycArticles, APA PsycExtra, APA PsycInfo, Embase, ERIC, ProQuest, PubMed, and Web of Science) with keywords related to community-academic partnerships and autism intervention. Articles were screened by title and abstract and with full text. We included studies that report community-academic partnership, empirical data on psychosocial or educational interventions, and inclusion of autistic children and their families.

Data Extraction:

We are extracting data on participant demographics, partnership, and implementation outcomes. For extraction of community-academic partnership data, we are using the conceptual framework for assessing research-practice partnerships (Henrick et al., 2017). For extraction of implementation outcomes data, we are using the taxonomy of distinct implementation outcomes (Proctor et al., 2011). We are appraising the quality of each study using JBI critical appraisal tools (Munn et al., 2020). Inter-rater reliability will be examined for 28.57% of included articles.

Data Analytic Approach:

To evaluate community-academic partnership quality, we will complete a narrative synthesis using the dimensional indicators from the conceptual framework for assessing research-practice partnerships. To explore associations between reported partnership quality and reported implementation outcomes, we will conduct exploratory correlations.

Results:

We identified 135 articles from our literature search and 9 articles from researcher knowledge. Title and abstract screening and full text review resulted in a total of 14 included articles. Preliminary data extraction (n=6 articles) has indicated varied reporting of community-academic partnership quality (Table 1) and implementation outcomes (Table 2). In terms of community-academic partnership quality indicators, conducting rigorous research to inform action appears to be one of the most common indicators assessed whereas building capacity seems to be one of the least common indicators assessed. For implementation outcomes, acceptability seems to be most commonly assessed and sustainability least commonly assessed.

Conclusions:

Our systematic review will provide the first examination of reported community-academic partnership quality in research on interventions for autistic children. This examination will also have potential to suggest broader relationships between community-academic partnership quality and implementation outcomes. Preliminary results highlight the potential need for greater focus on assessing capacity building and sustainability within community-academic partnerships.

402.083 (Poster) Accommodating the Neurodivergent Needs of Children in an Educational Concert Setting

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Background: As there is growing evidence for the benefits of inclusive education, many neurodiverse students, including autistic students, are integrated into mainstream classrooms. These students participate in functions and fieldtrips with their school groups regardless of the accommodations provided in locations outside of their educational institution. Given the evidence that autistic children have an interest and ability for music, functions and fieldtrips to attend musical concerts could be of particular interest for neurodiverse students, although the overall experience may not be adapted to their needs.

Objectives: We aimed to assess whether neurodiverse students attend music concerts as part of school fieldtrips and whether they appreciate the musical repertoire and overall concert experience.

Methods: The Montreal Symphony Orchestra (Orchestre Symphonique de Montreal [OSM]) and McGill University’s Behaviour, Autism, and NeuroDevelopment (BAND) Research Group, including an autistic researcher, collaborated to assess the audience’s appreciation of the
Results: Preliminary results showed that 63% of school groups attending OSM educational concerts included neurodivergent students, and approximately 70% of the neurodivergent students that attended struggled with some aspect of the concert experience. Nevertheless, 70% of educators of neurodivergent students deemed the content of the concerts to be suitable for their students. This has an important implication as it suggests that students are not struggling with the content of the concerts but the experiences surrounding it (i.e., volume (sensory sensitivities), concert dynamic, wait times, etc.). Indeed, most school groups (67%) reported that the dynamic between the theatrical and musical components of the concerts affected their concert experience, 20% reported that the volume of certain parts of the experience significantly impacted the experience.

Conclusions: A large proportion of school groups attending classical music concerts include neurodiverse students. Most of them struggle with some aspects of the concert experience although they enjoy the musical repertoire. Our results thus support existing evidence suggesting that neurodiverse students have an affinity for music and that efforts should be made to increase accessibility to musical activities. Our findings hold the potential to demonstrate that making accessibility a universal experience can benefit everyone, especially neurodivergent individuals.

402.084 (Poster) Amplifying Autistic Perspectives: Learning from and with Autistic Adults to Understand and Enhance Self-Determination
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Background: Self-determination has been conceptualized as making choices and decisions regarding one’s quality of life free from undue external influences or interference (Wehmeyer, 1999). Self-determination is a fundamental human right and is positively related to quality of life. However, autistic people often have less opportunities to be self-determined than non-autistic people.

Objectives: To (1) understand what self-determination means to autistic people; and (2) learn from autistic people how they would like to be supported to be self-determined.

Methods: This study is part of a larger study addressing our research objectives specific to autistic adults who do and do not experience co-occurring intellectual disability. These data were gathered from autistic adults who do not experience intellectual disability. Semi-structured interviews, 30-60 minutes, were done using Zoom. Interviews were recorded, transcribed and analyzed by three autistic and two non-autistic researchers through an iterative process of data familiarization, coding, and theme development. Coding and initial theme development were informed by the basic psychological needs put forth in self-determination theory: autonomy (self-directed freedom), competence (confidence in one’s ability) and relatedness (trusting and respectful relationships; Ryan & Deci, 2017).

Results: Participants included 19 autistic adults (mean age = 34.8 years, range 18-62 years) who represented diversity across many demographic variables (e.g., identified gender, educational attainment, income/financial resources, relationship status, employment status). Addressing objective #1, self-determination held the same meaning for autistic people as others, including non-autistic people. More specifically, participants discussed meaning related to making choices and decisions in life free from undue external influences or interference. However, most participant’s experiences of self-determination were centered around a lack of control, assimilation and conformity to neuro-typical and ableist social expectations, and forced choices. Preliminary analysis related to objective #2 revealed that participants desired guidance and support across all three psychological needs outlined in Deci and Ryan’s (2017) self-determination theory. Desired areas of support were noted in four themes: (1) opportunities to feel in control of one’s immediate and longer-term choices, and of one’s supports, including by whom, in what areas, and to what extent; (2) support with executive functioning and self-regulation, including options, consequences of those options, being given time to evaluate options, and identifying modifiable choices. The term ‘overwhelm’ was frequently used to describe emotional responses to choices that influence immediate and longer-term outcomes; (3) feeling supported to ‘unmask’ and be valued for one’s authentic autistic self, including the choices one makes; and (4) being recognized and respected as competent by others, even if one makes choices differently than they, or the majority of others, might have done.

Conclusions: Existing research suggests that autistic people live less self-determined lives than others, often due to ableist expectations. Our findings suggest that autistic adults desire to be self-determined and can flourish with support, as they determine to be appropriate, which might look different from supports commonly offered or sought by non-autistic people.

402.085 (Poster) An Examination of Mychart for Recruitment into a U.S.-Based Autism Research Cohort
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Background: We previously demonstrated that a research Best Practice Advisory (BPA) can successfully engage providers in the recruitment of autism patients for the national SPARK study (Simons Foundation Powering Autism Research for Knowledge; Simon et al., 2022; Duhon et al., 2022). However, provider dismissal of the BPA without action is common and tends to increase over time as a function of alert fatigue, which means that many potentially eligible and interested families may not learn about SPARK via their provider. MyChart is a secure web-platform that allows patients to view their medical information, communicate with their providers, and actively manage their healthcare—essentially, the patient-facing side of the electronic health record (EHR). Exploring MyChart as a research recruitment tool is valuable for assessing its efficacy in capturing families for research opportunities via a familiar EHR platform.

Objectives: To examine the utility of MyChart in recruiting pediatric patients with autism for the SPARK study at the Texas Children's Hospital site.

Methods: Between November 2021 and October 2022, 2,086 families of children with ASD who triggered the SPARK BPA but had no provider response recorded were sent a SPARK recruitment message via MyChart. The message included a description of the study, eligibility criteria, and incentive information. Families could respond to the message as either Interested or Declined; if Interested, the research team emailed them additional study information, including the registration link. 297 Interested caregivers who had not enrolled after ~3 months were sent a reminder email. 223 families who never responded to the MyChart message triggered the SPARK BPA a second time during a subsequent clinical visit. Participant MyChart responses and SPARK enrollment status were tracked and analyzed descriptively.

Results: During the year-long surveillance, 400 (19%) caregivers responded Interested to the MyChart message; 58 (14.5%) of this group enrolled after receiving the initial recruitment email and 16 (5%) enrolled after the reminder email. 136 (7%) responded Declined to the MyChart message; 3 (2%) of them enrolled in the study. 1550 (74%) did not respond to the MyChart message; 3 (0.2%) enrolled in SPARK. Of the 223 who triggered the BPA again, 101 (45%) responded Interested; 14 (14%) among this Interested group enrolled. Overall, 94 (4.5%) families who received a MyChart message about SPARK enrolled in the study (see Figure 1). Analyses examining rates of study completion and factors that predict enrollment following receipt of the MyChart message are currently underway.

Conclusions: Nearly 1 in 5 families indicated interest in the SPARK study following receipt of the MyChart message, and ~20% of this group enrolled in the study after receiving emailed information. Although these numbers are lower than those seen with the SPARK BPA, they nevertheless demonstrate the viability of MyChart to engage families in the study. That some families ultimately enrolled in SPARK who declined or ignored the MyChart message suggests that they may have learned about it via another compelling channel (e.g., social media, friend/family member). Further research should explore functionality within the EHR to support clinical-research recruitment and retention efforts.

402.086 (Poster) An Examination of Parent’s Perspective of Paraprofessionals Delivering Direct Applied Behavior Analysis
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Background: Applied behavior analysis (ABA) is an effective and commonly used intervention supporting the skill development of autistic children and youth. In the US the most common ABA model for autistic children is practitioner-mediated ABA. While parent training is often included, most direct treatment in the practitioner-mediated model is provided by a paraprofessional usually working under the supervision of Board Certified Behavior Analyst® (BCBA®). Despite the frequent use of paraprofessionals in ABA there is a paucity of research investigating parent’s perspectives of paraprofessionals. Understanding parent’s perspectives of the paraprofessional working with their autistic child is an important step in improving the practitioner-mediated model.

Objectives: Examine parent’s perceptions of paraprofessional competency in practitioner-mediated ABA provided in the home or community settings.

Methods: A thematic analysis of 130 parent’s comments about paraprofessionals working with their child was conducted. Comments were taken from a satisfaction survey asking parents questions about their experience in ABA. Only comments about paraprofessionals were used for this study.

Results: Thematic coding resulted in 69 positive and 61 negative parent perceptions of paraprofessionals. Five themes emerged from the thematic analysis of parent’s comments about the paraprofessional working with their child; experience/knowledge, consistency, caring behavior, professionalism and match between the child and paraprofessional. For both positive and negative comments “knowledge and experience” was the most common theme. As one parent put it, “Give more training to the new ABA [paraprofessional] updated them in the different behavior trained them on autism behaviors.” An example of a positive comment with the knowledge and experience theme was, “My child’s [paraprofessional] is highly experienced ... and she's always giving me tips on how to work with my child throughout the day and outside of sessions.” The second most common theme for negative comments was “consistency,” but this theme was mentioned much less often than knowledge and experience. For positive comments the second most common theme was “caring behavior” but as with the negative comments this secondary theme appeared much less often than knowledge and experience. Even when secondary themes were
mentioned these themes were often combined with the knowledge and experience theme. For example, one parent who had a negative perception of the paraprofessionals working with their child said, “We had frequent [paraprofessional] change[s] and some of them weren’t equipped to do their job.”

Conclusions: For both positive and negative perceptions of paraprofessionals, parents mentioned knowledge and experience of the paraprofessional working with their child most often. Fidelity in ABA treatment implementation is an important factor in achieving good outcomes and researchers and others in the field of ABA have expressed concerns about paraprofessional training pointing out paraprofessionals working in ABA have less training than practitioners participating in university studies (Leaf et al, 2017). While no parent mentioned the term fidelity directly for either negative or positive perceptions the theme of knowledge and experience speaks to fidelity of paraprofessional performance as well as training of paraprofessionals.

402.087 (Poster) An Exploration of the Experiences of Neurodiversity-Affirming Families
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Background: There has been an increased interest in a human-rights based approach to parenting Autistic children by stakeholders. Research literature to date has primarily focused on suggestions for researchers and practitioners.

Objectives: To explore the experiences of families who take a human-rights based, neurodiversity-affirmative approach to parenting Autistic child(ren) with and without co-occurring conditions.

Methods: Twenty-nine self-identified neurodiversity-affirming parents participated in a semi-structured, synchronous online interview. An inductive reflexive thematic analysis was employed to analyse the data.

Results: Initial analysis shows two primary themes and three sub-themes: In theme 1 "My child is a complete person", participant's explore their perspective of seeing their child as a whole human being, different, but not less-than neurotypical people. Sub-themes include (a) how parents are "seeing the world through a different, more positive lens", since adopting a human-rights based approach to autistic people, and how (b) professionals and other people in children's lives "don't see the psychological harm" of neuro-normative, conforming approaches. Theme 2 describes how parents work to create a psychologically safe environment where their children are free to be themselves in "home as haven", sub-theme (a) "managing conflicting needs" explores participant's experiences of woking to create a home environment that meets the various needs of different family members. Further analysis is ongoing and results will be finalised and available prior to the presentation.

Conclusions: The current study represents the first exploration into the experiences of families who take a human-rights based Neurodiversity-Affirmative approach to parenting autistic child/ren. This study adds to the literature in understanding the experiences of families who apply the neurodiversity paradigm which represents a fundamental shift in attitude from "autistic people as deficit" to "autistic people as valid, natural variation".

402.088 (Poster) Applying Communication Privacy Management Theory to the Use of Social Technologies for Adults with Autism and Allies
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Background: In 2021, over 4.48 billion people used social media worldwide. Much research focuses on understanding privacy needs for the general population of social media users, yet privacy for Autistic users is under-explored. Traditional privacy frameworks, such as Communication Privacy Management theory (CPM) have been useful in understanding privacy expectations and behaviors for the general population when multiple people are involved in managing whether to share a given piece of personal information. It can serve as a useful tool for understanding privacy attitudes and behaviors of autistic users and their allies (e.g., parents, case workers) who are often involved with privacy management.

Objectives: CPM asserts that individuals create “rules” regarding how their private information is shared. We aim to understand what privacy rules autistic users and their allies are creating to dictate online social behavior.
Methods:

We partnered with two community organizations located in the Northeastern United States that provide day services for Autistic adults. We interviewed eight clients (who are formally diagnosed with Autism, “participants”) and fourteen allies (case workers, parents). We extracted all instances of ally-participant mediation and engaged in theoretically-driven coding using CPM, supplemented by open-coding.

Results:

Interviewees verbalized many of their privacy rules, while others we observed based on behavior. Explicit rules vocalized by participants included “I don’t accept Facebook requests from men” (participant 2) or “I don’t share any money online” (participant 4). In other instances, rules were not explicitly stated, but rather implicitly revealed by behavior. Many participants shared personal information with potential romantic partners, revealing an implicit rule of behavior between partners, even if they had just connected online. Other participants had much more accepting rules regarding sharing strong negative emotions or nude photos online than their allies did. We found that ally rules often did not match the rules participants created for themselves. For example, if a participant felt it was appropriate to share their exact location on their Facebook wall, but an ally did not, this would create a mismatch of rules. The ally’s rules were more concrete and verbalized more frequently than rules created by other participants. Some examples of ally rules included: don’t accept every friend’s request, filter content based on context, don’t express strong negative emotions online, don’t trust “romantic interests”, never share location and many more. In our presentation we will share more about common privacy rule mismatches.

Conclusions:

Through this study we found that many participants shared personal information at a more intimate level than most allies felt comfortable with. This mis-match of “rules” led to conflict. We discuss how CPM can be utilized as a lens by which to mediate conflicts. By analyzing both user and ally rules, one can then identify the extent to which privacy risks exist due to the mismatch. It may also help allies and Autistic individuals better express their desires and explain the situations where they feel sharing private information is and is not appropriate. Engaging in such dialog can allow them to develop mutually agreeable rules around sharing.

402.089 (Poster) Association between Parent Stress and Family/Child Quality of Life Is Mediated By Mental Health in Parents of Autistic Youth
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Background: Quality of life (QOL) is increasingly considered an important outcome measure in autism research. As such, it is important to consider factors which may affect QOL for autistic individuals and their families. Parental characteristics are likely to have a significant impact on QOL in families of autistic youth; literature suggests that parents of autistic youth often have higher levels of stress and more internalizing symptoms than parents of non-autistic peers due to multiple familial and systemic factors (Clauser et al., 2021; Cohrs & Leslie, 2017). Given these differences in parental characteristics and recent interest in QOL, it is critical to understand associations between parent wellbeing factors and QOL for autistic children and their families.

Objectives: The current study aimed to evaluate whether parent internalizing symptoms mediated the association between parent stress/family QOL and parent stress/child QOL in autistic and non-autistic youth.

Methods: 117 parents of autistic youth and 125 parents of non-autistic youth ages 2-17 completed the Perceived Stress Scale (PSS) which measured parent stress; the Beach Family Quality of Life questionnaire (FQOL) which measured parent perception of family functioning and cohesion; the Pediatric Quality of Life Inventory (PedsQL), which measured physical, emotional, social, and school functioning of youth; and the Dysphoria subscale of the Inventory of Depression and Anxiety Symptoms, Second Edition (IDAS-II), which measured parent depression/anxiety symptoms. Mediation analyses were conducted using the SPSS PROCESS macro (Hayes, 2018) to determine whether parent anxiety/depression symptoms mediated the following associations: 1) parent stress and family QOL in autistic youth; 2) parent stress and family QOL in non-autistic youth; 3) parent stress and child QOL in autistic youth; and 4) parent stress and child QOL in non-autistic youth.

Results: Results of our mediation models suggested that parent internalizing symptoms partially mediated the association between parent stress and FQOL (indirect effect estimate = -.17, CI=-.27 -.08, see Figure 1) and completely mediated the association between parent stress and child QOL in autistic youth (indirect effect estimate = -.10, CI =-.1.57 -.51, see Figure 1). In non-autistic youth, parent internalizing symptoms did not mediate either the stress-family QOL association or the stress-child QOL association.

Conclusions: The current study finds that for autistic youth, the association between stress and family QOL is partially mediated by parental mental health symptoms, while the association between parental stress and child QOL is entirely mediated by parent mental health symptoms.
Past studies have identified several barriers to autism screening in Ecuadorian paediatric settings, which mainly concern the availability of indicated mental health treatment for parents has the potential to benefit the family unit as well as autistic youth specifically. Previous work has found positive effects of psychotherapy for parents of autistic youth (Lunsky et al., 2018); future research should endeavor to prospectively consider the impact of parental individual therapy on the overall wellbeing of the family and the autistic child.

402.090 (Poster) Attitudes of Early Childcare Professionals Toward Inclusive Education and the Inclusion of Children with ASD
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Background: The prevalence of autism spectrum disorder (ASD) continues to increase (1 in 44 children USA; CDC; 2021). With new initiatives and policy for integration into educational settings at an early age (Yu, 2019), this increase is also observed in early childhood daycares (D'Agostino & Douglas, 2021). Several studies show that school inclusion quality depends on several factors, including attitudes of teachers and administrators towards inclusive education (Jury et al., 2021). Although early childhood daycares are often the first place of integration for these children, few studies have focused on the attitudes of staff in these settings (Lee et al., 2015). Yet, the experience of inclusion in early childhood, including staff’s attitudes and practices, has important repercussions on social integration and inclusion in schools (Lee et al., 2015).

Objectives: To document the three dimensions of attitudes (affective, cognitive, behavioral) of 211 mainstream daycares professionals (159 early childhood educators and 52 administrators), toward inclusive education and the inclusion of children with ASD.

Methods: This study is a mixed-method research design using standardized questionnaires (descriptive quantitative analyzes and independent sample t-test) and clinical vignettes (qualitative analyses; L'Ecuyer, 1990), to measure the concept of attitudes according to several perspectives. The sample consisted of 190 women and 21 men. Among these, 87.2% of participants had experience working in ASD, 23.2% were certified in Special Education, and 30.8% had training in ASD. The Multidimensional Attitudes Toward Preschool Inclusive Education Scale (MATPIES; Lohmann et al., 2016) was first translated and validated in French and English for this study (Mejia-Cardenas et al., 2022) and comprise 15 items using a 6-level Likert scale (1 = most negative, 6 = most positive) and 4 subscales (positive and negative believes, affective, behavioral). The MATPIES and clinical vignettes describing three profiles of ASD were administered in an online survey.

Results: Overall, participants expressed positive attitudes towards inclusive education on all subscales (range: 3.05 to 5.34). Educators reported higher scores on all subscales compared to administrators (p <0.001) except on the affective subscale (p = 0.129). Several individual factors related to the participants (e.g., type of job), to the profiles of the children (e.g., symptoms severity), and to the context (e.g., resources) were significantly associated with attitudes towards inclusive education and ASD. The behaviors perceived as the most perturbing for inclusion were difficulties with emotional and behavioral regulation. The characteristics belonging to the second domain of the diagnostic criteria of the DSM-5 were most identified by the respondents. Having had a positive integration experience with similar children, as well as adequate training were factors commonly mentioned by participants for feeling able to welcome these children into their groups.

Conclusions: Given the importance of early childhood environments as one the first for inclusion, studying educators' attitudes towards inclusion is a priority, because it allows for a better understanding of the issues related to inclusion and children with ASD. In addition, it allows for the identification of staff training needs, both in general knowledge about ASD and in evidence-based interventions that promote inclusion.

402.091 (Poster) Autism Diagnostic Experiences of Parents in Ecuador
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Background:

Timely identification of autism in children could ease access to diagnostic and support services that may be beneficial to families and their children. Many children show the first signs of autism between the ages of twelve to eighteen months or earlier (Zwaigenbaum & Penner, 2018), and parents are often the first to notice that their child may be developing differently from other children. Parents’ responses can contribute to timely access to a diagnostic evaluation and subsequent support. However, a bias affecting low-income and non-English-speaking families has been noted in high resources countries (Nowell et al., 2015). In Ecuador, the latest official estimates in 2017 indicated the prevalence of autism at 0.28% in children under five years old, and 1266 people were registered with a diagnosis of autism. Past studies have identified several barriers to autism screening in Ecuadorian paediatric settings, which mainly concern the availability of...
time, knowledge, and resources to refer children (Buffle et al., 2022). A greater understanding of the earliest signs of autism and parents' reaction to these early signs have significant potential to support early identification and diagnosis of autism in Ecuador.

Objectives:

We aimed to collect data from an Ecuadorian sample of parents of children who had received a formal diagnosis of autism, focusing on: (i) the child's age at initial developmental concerns, (ii) the nature of initial concerns, (iii) the time from first concerns until the first consultation, (iv) whether the parents consulted with private or public networks, (v) the number of professionals consulted through the process, and (vi) feelings and thoughts when receiving the diagnosis.

Methods:

Six hundred fifty caregivers (567 women, 84 men) of children with a formal diagnosis of autism (ages 2 to 15) from diverse socio-economic backgrounds and geographic areas participated in an online survey (adapted from Crane et al., 2016, who examined autism diagnostic experiences in the United Kingdom). Participants were recruited via the Ecuadorian Parent Association (APADA) and the Ecuadorian National Council on Disability and Equality, the former of whom provided their telephone number for parents aiming to include participants with no internet access.

Results:

Most caregivers identified initial signs of autism by the age of two, and a smaller proportion between three and four years. The most common first concerns were delays in language and social development. Most caregivers sought professional help immediately or in the six months following the first concerns, mainly in the private health sector. In most cases, four or more professionals were encountered to obtain a diagnosis. Parents reported feelings of fear, worry, helplessness, frustration and uncertainty at the point of diagnosis.

Conclusions:

Some of these results are consistent with previous findings in high- and low-to-middle-income countries, on the importance of proactive professional responses to parental concerns. These findings can inform Ecuadorian health policies on the need for standardized screening and assessment in private and public networks. They also reiterate the importance of continuous professional training to build the capacity to deliver timely and accurate autism diagnoses and post-diagnostic support.

402.092 (Poster) Autism Spectrum Conditions in Peru: First Descriptions and Current Overview
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Background: Autism spectrum conditions - ASCs are characterized by a particular cognitive phenotype that underlies (A) persistent difficulties in communication and social interaction and (B) the presence of restrictive and repetitive patterns of behavior, interests, or activities. The global prevalence of ASCs is about 1%, but in many low-and middle-income countries (LMICs) there are no prevalence estimates.

Objectives: This review aims to present the first descriptions of ASCs in Peru, to understand from a historical perspective the current challenges regarding diagnosis and treatments.

Methods: MEDLINE, Embase, and PsycINFO databases were searched. The search combined keywords and MeSH terms: "autism" or "autism spectrum disorder" and "Peru", also considering their translations into Spanish. A manual search of reference lists for review articles, reports, editorials, and resource texts was also performed; and an online search of government, university, and non-government websites to identify other non-peer-reviewed data sources.

Results: The scientific study of nervous and mental diseases began to be cultivated in Peru shortly before 1920. Perhaps the first article that refers to a case of "Childhood Schizophrenia", in terms of Eugen Bleuler, was published in 1944. There is evidence that in 1959 the diagnosis of "Early Childhood Autism" was raised in one case. Currently, there is a significant lack of ASCs diagnoses in Peru and there are significant problems of access to specialized, timely and quality services, especially in health and education.

Conclusions: The ASCs in Peru represent a great challenge that must be addressed as a priority. The need to implement effective public policies to improve access to early diagnosis is evident. More research is needed to identify the short-, medium-, and long-term needs of people with ASCs in Peru.

402.093 (Poster) Autism Voices: Toward Better Methods to Capture First-Person Perspectives of Autistic Individuals
Background: According to the United Nations Convention on the Rights of the Child, all children have a right to be included in decisions concerning them, regardless of their abilities. Participatory research is lacking in the autism field and very few studies include the first-person perspectives of autistic individuals (DePape & Lindsay, 2016). Further, when autistic individuals are included in research it is rarely those with intellectual disabilities or communication challenges.

Objectives: The Autism Voices project aimed to develop methods to capture the first-person perspectives of autistic youth with various intellectual and language abilities and to apply the methods to inquire about their daily experiences and hope for the future.

Methods: We first conducted a synthesis of methods previously used to obtain the first-person perspectives of youth with various disabilities. The identified methods were then presented and discussed in a parent focus group to determine their suitability for autistic youth. The synthesis, as well as strength-based methods and universal design, then informed the development of a protocol, which included a pre-interview survey and a semi-structured interview. The protocol was piloted with 31 autistic youth with various language and intellectual abilities communicative acts used by participants and the mitigation strategies to enhance communication used by interviewers were coded. Finally, a thematic analysis of the responses provided by the participants was carried out.

Results: Six methods (questionnaires, interviews, group discussion, narratives, diaries and art) and four communication output modalities (language, sign language and gestures, writing, and images) were identified in the synthesis. Potential barriers and facilitators to the use of these methods with autistic youth were discussed in the focus group and led to the creation of the Autism Voices interview protocol. Participants interviewed used both conventional and alternative communication methods, such as echolalia for example to engage with interviewers. Mitigation strategies used by interviewers, such as reformulating questions to avoid response patterns, efficiently enhanced communication, especially with minimally verbal participants. Finally, six themes emerged from the interviews: 1) autistic identities, 2) thinking about the future, 3) seeking social connection on their own terms, 4) seeking autonomy, 5) school as both a stressor and social facilitator and 6) experiences of stress and anxiety.

Conclusions: The contribution and continuous collaboration of autistic youth, families and experts is key when developing novel inclusive methods. Our experience using the Autism Voices protocol highlights that communication goes beyond verbally answering questions and shows that alternative communication acts can provide unique insight into autistic youth’s perspectives. The themes raised by youth during the interviews parallel what many typically developing teenagers experience, but are influenced by their experience of autism. Overall, Autism Voices provides a promising novel method to facilitate the active involvement of autistic youth of all intellectual and language levels. The current talk will highlight the lessons learned through the project and how Autism Voices can be applied in multiple settings.

Background: The COVID-19 pandemic thrust families of school-aged children into an era of social distancing and remote learning that changed the family dynamic in a myriad of ways. Transitioning to online education was especially hard on families of children with autism around the globe, finding that families found challenges guiding their children and needed supports to help with their stress (Althiabi, 2021), which was difficult as these parents felt that they were poorly supported by their children's schools (Heyworth et. al, 2021) and their mental health and that of their children was being severely impacted by the pandemic (Bozkus-Genc & Sani-Bozkurt, 2022).

Objectives: This study aims to examine what resources and support parents of children with autism desire compared to parents of typically developing children and those with other special education needs, to better illustrate the areas of need for both groups during this unprecedented time.

Methods: Participants were part of the Parent Experience of Remote Learning Study (PERLS), a longitudinal study that surveyed parents of school-aged children (Kindergarten - 12th grade) monthly over six months, starting in March 2021. At timepoint one, respondents were asked an open-ended survey question, “In your own words, what resources or supports do you wish you had right now?” Researchers conducted a thematic analysis, leaving the substantive parent responses (n = 529) almost evenly split between remote and hybrid instruction, with only 4% fully in-person. For the purposes of this study, results were grouped into parents who had a child with ASD (n = 60; 51.7% fathers and 48.3% mothers) and those who had a child that was typically developing and all other SEN (n = 469; 45.3% fathers and 54.7% mothers).
Results: Fifteen themes emerged from the qualitative data. The top five endorsed categories for parents of children with ASD are general (e.g., “hope to get more help and support” and “face-to-face communication opportunities”); 20.00%, health and wellness (13.33%), educational resources and services (11.67%), financial support (10.00%), and return to normalcy before the pandemic (8.33%). For parents of typically developing children or those with other SEN, the top five themes were financial support (20.90%), health and wellness (20.26%), satisfaction (9.17%), school support (8.32%), and day-to-day help and support (7.89%). None of the parents of children with ASD were unsure or endorsed religious and spiritual support.

Conclusions: The current analysis showed that a year into the pandemic, the resource and support needs for parents of school-aged children differed between those with children with autism and those without. The autism group valued educational resources and services, such as professional support and services, while other parents valued school support with the day-to-day. The group of children with ASD had a desire to return to normalcy before the pandemic that was far stronger than the other group, and while satisfaction was third highest endorsed by the "TD and all else" group, it was the lowest for those with autistic children.

**402.095 (Poster) Autistic Mothers - Perspectives on Parenthood**

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Background: There is a large body of research on the experiences, quality of life, well-being and mental health of parents of autistic children. However, there is a small number of studies that include the experience of autistic parents and an even smaller number of those with an active participation of autistic people. In this small participatory study autistic people were included in defining aims, formulating interview questions and final analysis of data.

Objectives: The aim of this study was to gain insight into the autistic mothers' experience of parenthood. Specifically, we wanted to explore the relationship with children, characteristics of parenting and support needs of autistic mothers.

Methods: Participants were 7 autistic mothers with at least one autistic child. Data was collected through semi-structured interviews that were conducted online or in person depending on the preferences of each participant. Data was analysed using thematic analysis.

Results: Key findings were organized in three themes, Perception of parent-child relationship, Autistic parenting, and Support. Although some mothers consider their relationship with a child overwhelming, demanding and stressful, all participants consider it a fulfilling and valuable experience that inspired their personal growth. Advantages of being autistic parents include learning from own experiences, understanding of autistic child’s needs, acceptance, and better communication with the child. The sources of support in parenting included only informal support and the lack of formal support for both mothers and children was recognized.

Conclusions: This study provides an insight into experiences and support needs of autistic mothers. Further research that includes perspectives and active participation of autistic parents is needed to provide a foundation for the development of the support that will be tailored to the needs of the family.

**402.096 (Poster) It's More Than a Score: Describing Participation Profiles in Autistic Children and Adolescents**

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Background: Participating in activities is viewed as supporting an individual’s quality of life and influencing family functioning. To date, the research on participation in autistic individuals has tended to describe scores, with the implied (neurotypically-driven) assumption that more is better and little consideration of what that score reflects. A different approach is to identify and describe profiles of participation scores within autistic young people and explore factors that differ between those. This would not only further our understanding of participation in autism, but also identify avenues of support for those who may wish to adjust their profile.

Objectives: The aim of this exploratory study was to investigate the participation profiles of autistic children, and to identify if child and/or family factors differed between the participation profiles.

Methods: Data for two cohorts of autistic children were extracted from a longitudinal study; the younger cohort were aged 6-8 years (n = 98) and the older cohort aged 10-13 years (n = 95). Caregivers reported on their child’s participation across home, school and community using the Participation and Environment Measure Child Youth (PEM-CY). In addition, caregivers completed the Social Communication Questionnaire (SCQ), Short Sensory Profile -2 (SSP-2), Anxiety Scale for Children with Autism Spectrum Disorder: Parent Version (ASC-ASD-P) and provided their family income to identify which child and family factors differed between profiles. Profile development was determined by an analytic hierarchy process with the final model selected based on the profile number that was identified as best fit.
Results: In the younger cohort, five participation profiles were identified compared to four participation profiles in the older group. Profiles in the younger cohort showed differing participation patterns across contexts. Profiles in the older cohort showed a more stable pattern of low, med, and high participation across all domains. Autism characteristics and anxiety differed between profiles for the younger cohort. Sensory, anxiety and family income differed between profiles for the older cohort.

Conclusions:

To the authors’ knowledge this is the first study to investigate participation profiles in autistic children, highlighting participation varies within this population. Consideration of what is desired participation for autistic children is an important area for future research. Some child and family factors were associated with different participation profiles, and these appeared to differ with age. Barriers to participation is an important area of consideration for future research to support autistic individuals to live a life they find meaningful.

402.097 (Poster) Autistic Perspectives on the Acceptability of Pediatric Autism Therapies
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Background: Autistic children and their families may access different services, such as occupational therapy (OT), speech language pathology (SLP) services, applied behaviour analysis (ABA)-based therapies and physiotherapy (PT). There are varying levels of evidence supporting the efficacy of these therapies, and some autistic-led advocacy is critical of the methods and aims of certain services. There are a few academic articles exploring autistic perspectives on these therapies; however, the sample sizes are relatively small. Exploring stakeholder perspectives is critical to ensure services are appropriate and informed by lived experiences. This work is part of a larger survey that explored the perspectives of autistic individuals, parents of autistic children, and clinicians on these services.

Objectives: This study explored how autistic people perceive the acceptability of pediatric autism therapies (OT, SLP services, ABA-based therapies, PT).

Methods: Using the Theoretical Framework of Acceptability (TFA), a mixed methods survey was built with input from autistic people, parents of autistic children and clinicians. The survey was shared online through social media and autism organizations. Autistic respondents’ demographic data and perspectives on the therapies were captured. An acceptability sub-score was produced for each therapy, ranging from 0 (least accepting) to 64 (most accepting). The sub-scores were combined into an overall acceptability score. Open-ended questions were qualitatively analyzed using deductive content analysis following the TFA, and categories within constructs of ethicality and intervention coherence are presented.

Results: 21 autistic people completed the survey. Their median (range) sub-scores were OT 40 (16 – 56), SLP 43.5 (28 – 57), ABA 19.5 (8 – 48), PT 39.5 (28 – 57). Qualitative categories within the TFA construct of ethicality included: 1) concerns about harms and negative experiences that can potentially occur because of therapies; 2) a lack of support for what respondents identified as behavioural techniques or methods. Intervention coherence reflects an individual’s understanding of a therapy, and respondents viewed the goals and methods of therapies as acceptable or unacceptable. With respect to intervention coherence, unacceptable goals were identified by respondents as those that aim to promote neurotypical behaviour or hide autistic identities. Acceptable goals included those that were affirming of neurodiversity, provide strategies to navigate challenges, and are inclusive of all forms of communication.

Conclusions: Our findings are similar to existing perspectives that some autistic people have towards ABA-based therapies. However, these findings also highlight that some autistic people may view any therapy as unacceptable if it promotes neurotypical behaviour or incorporates behavioural methods. Autistic people, regardless of if they have engaged in a therapy, bring important insights into how therapies can help autistic children thrive. Further work is needed to gain a better understanding of specific aspects of behavioral methods that are viewed as unacceptable, particularly given that some strategies, such as positive reinforcement, are widely used in different therapies and with the general population. Future work should explore perspectives from larger samples of autistic people, with focus on individuals who do not engage with social media and compare findings to parents of autistic children and clinicians.

402.098 (Poster) Autistic Women, Nonbinary, and Transgender Autistic Stakeholders’ Perceptions of the Intersection between Autism and Policing

Background:
Individuals with disabilities, such as autism, face an elevated risk of negative outcomes during police interactions, including increased risk of injury and death (Bronson, Maruschak, & Berzofsky, 2015; Perry & Carter-Long, 2016; Swaine et al., 2016). In the United States, evidence demonstrates inequitable treatment from police officers towards marginalized communities, especially individuals with multiple intersecting marginalized identities, including gender diverse autistic individuals, which only increases their risk of negative outcomes (Lipperman-Kreda et al., 2020). However, it is not known whether the perception of autism and policing differ among self-identified female, gender diverse, and male adult autistic stakeholders.

Objectives: Compare perceptions of policing among autistic adults who self-identify as female, gender diverse (e.g., non-binary, transgender), or male.

Methods: One hundred and seven adult autistic stakeholders (Table 1) responded to a 10- to 15-minute online survey (Table 2). Fisher’s exact test compared patterns of responding among different gender groups.

Results:

A majority of participants (91%) reported interacting with police. Approximately half the sample reported that their diagnosis influenced their interactions with police (51%) and the majority felt that police lack the skills necessary to interact safely with autistic individuals (79%; no significant effects of gender identity). However, when asked whether they think gender has influenced their interactions with police, 51% of female autistic stakeholders and 50% of gender diverse autistic stakeholders responded “Yes”, in contrast to only 9.5% of male autistic stakeholders ($p<0.0001$). There was an effect of gender identity on participants’ level of comfort in telling police officers about their diagnosis ($p<0.0001$), with male-identified autistic stakeholders more likely to report feeling comfortable disclosing their autism (67%) compared to 33% of female-identified autistic stakeholders and only 21% of gender-diverse stakeholders. Significantly more male autistic stakeholders thought telling police officers about their diagnosis would be helpful to the situation (62%), in contrast to 42% of female autistic stakeholders and 14% of gender diverse autistic stakeholders ($p=0.0011$). Overall, 89% of stakeholders worried that their autistic traits would be perceived as dangerous or suspicious by police officers, and this concern was amplified for female (93%) and gender diverse (96%) stakeholders relative to male autistic stakeholders (74%; $p=0.0179$). Finally, 60% of male autistic stakeholders, 40% of female autistic stakeholders, and only 5% of gender diverse autistic stakeholders reported that they believe police departments provide justice equally to all people ($p<0.0001$).

Conclusions:

Autistic stakeholders are concerned about safety during police interactions, with strikingly amplified concerns among female-identified and gender diverse individuals. These findings suggest that individuals with multiple marginalized identities, (i.e., autistic female-identified and gender-diverse individuals) experience persistent fear for their safety when interacting with police officers. These findings underscore an increased need to incorporate diverse perspectives from civilians, particularly those at the critical intersection of gender diversity and autism, when developing police policies and best practices in order to help ensure safe interactions. This may motivate further support and training to lower the risk of injury, death, or other negative outcomes from interactions between police and civilians with disabilities.

402.099 (Poster) Barriers and Facilitators to Coping with the COVID-19 Pandemic: Contextualizing Perceptions of Canadian Caregivers of Youth with Developmental Delays and Disabilities


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Background: The UNICEF-World Health Organization Global Report on Developmental Delays, Disorders, and Disabilities, is an ongoing initiative with the aim of increasing awareness, compiling data, proving guidance on strengthening health systems, and engaging international and country-level partners. Previous data from a caregiver survey assessing impact of the COVID-19 pandemic showed that half of youths with developmental delays and disabilities (DDDs) and their caregivers struggled to cope during the pandemic, with a significant portion reporting a lack of supports and difficulty managing the worsening of the child’s symptoms in isolation (Yusuf et al., 2022). Governments created service strategies supporting vulnerable groups. However, little is known about the alignment between COVID-19 policies for persons with disabilities and their lived experiences. Contextualizing caregivers’ experiences can promote the development of tailored public supports for these families as we emerge from the pandemic.

Objectives: To contextualize experiences of youth with DDDs and their caregivers during the pandemic in relation to Canadian COVID-19 policies for persons with disabilities.

Methods: Online survey data were collected from June-July 2020, leading to a convenience sample of caregivers of youth with DDDs (N=883) across Canada. Data for this project were responses to two open-ended questions: a) “Write down anything that has made it hard to keep safe and cope during the pandemic. Think about yourself and everyone in your home when answering.” and b) “Write down
anything that has made it easier to keep safe and cope during the pandemic. Think about yourself and everyone in your home when answering”. We conducted a thematic analysis of responses using inductive and deductive coding on NVivo software. Overarching codes derived from the dataset were mapped onto federal and provincial policies published during the pandemic. Parallels with these policies supported the exploration of families’ and youths’ experiences during the same period.

Results: Five hundred and thirty-one (N=531) participants answered open-ended questions. Barriers to coping at the individual level were family mental health complications, concerns about regression of the child’s condition, along with challenges involving the child’s online schooling, insufficient play spaces, and managing physical health in quarantine. Environmental barriers included the worsening of families’ finances, loss of public services, and experiencing stigma. In contrast, caregivers reported several facilitators to coping, including media entertainment, time spent with family, outdoor spaces, and their child’s resilience. Other environmental facilitators were receiving community support, information from government, and access to telehealth services. Few COVID-19 policies aligned practical services to caregiver-identified barriers. Facilitators aligned with pre-existing policies (e.g., leisure access and physical activities) but some COVID-19 restrictions were deterrents to accessing these facilitators during the pandemic.

Conclusions: Prioritizing needs of families of youths with DDDs during a public health emergency can significantly impact their experiences and mental health. Increasing financial benefits for these families, offering telehealth services, and creating inclusive public spaces for play are priority areas exiting the pandemic.

402.100 (Poster) Be-Longing: Experiences of Autistic Girls in English Schools
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Background: Autistic girls’ social motivation and associated desire to fit in, suggests that feeling a sense of belonging is important for the girls. This may be particularly relevant during adolescence, as this period is marked by uncertainty and loneliness due to increasing independence and development of identity. There is evidence that feeling a sense of belonging provides pupils social acceptance and is a protective factor against harmful psychological outcomes. Despite this, limited research has considered autistic girls belonging experiences in mainstream schools and what needs to change to facilitate belonging. Further, the historical underdiagnoses of autistic girls has entailed that their personal stories are mostly absent from autism research.

Objectives: This research prioritises autistic girls’ voices by exploring the girls’ constructs of belonging, including the facilitators of and barriers to feeling a sense of belonging, and the impact on wellbeing.

Methods: This study included the autistic community in the research process in various ways. An autism advisory group provided consultation on pre-study considerations, data collection and data analysis. Personal constructs and lived experiences of school belonging were explored using semi-structured interviews and personalised activities (e.g. drawings and poetry) with eighteen adolescent autistic girls. Participants were involved in the data analysis process as they commented on emerging codes and themes.

Results: Data were analysed using thematic analysis and five themes were identified: (I) autistic girl’s want to be seen and heard, (II) the joys and pains of mutuality, (III) losing myself under the mask, (IV) marginalisation links with invalidation, (V) sensory fatigue.

Conclusions: The autistic girls defined belonging from a relational perspective, as they want to be externally valued, heard, and involved in the school community. However, aspects of masking, stigma and sensory experiences limit the girls belonging in school. Implications for schools and Educational Psychologists are discussed using an experience sensitive framework of wellbeing.

402.101 (Poster) Caregiver Attendance Pattern in a Caregiver-Focused Intervention for Families of Children with Autism
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Background: Retention is a significant issue in caregiver-focused interventions (Axford et al., 2012; Kasari et al., 2014) with attrition ranging from 35% to 60%. Missed visits reduce treatment effectiveness (Haine-Schlagel & Walsh, 2015). We explored caregiver attendance patterns in a caregiver service navigation intervention, Mind the Gap (MTG), using latent class analysis (LCA), as a first step towards identifying strategies to improve retention.

Objectives: Identify patterns of caregiver attendance, and child and caregiver characteristics associated with them.

Methods: MTG comprises strategies to support caregiver engagement in minoritized families (Stahmer et al., 2019), such as culturally-matched peer parents as navigators, flexible meeting methods (e.g., in person, zoom) or location (e.g., home, community center), and extended timeline for intervention completion (Iadarola et al., 2020). MTG provides education about autism, service navigation, and other relevant topics. Participants were primary caregivers of children (2-7 years) with an autism diagnosis (n = 52). Navigators who were trained parents of autistic children implemented MTG. Race, ethnicity, gender, age, age of diagnosis, and employment status were tested as variables associated with latent class membership. Attendance was coded dichotomously for each session (1 = attended, 2 = no show/cancelled). Models were estimated using SAS 9.3 via Proc LCA using maximum likelihood estimation.

Results: Participants were mostly female (85%); about a third were Hispanic (35%) or White (35%), and 21% spoke Spanish or Korean. Average child age was 4.46 years, and average age of diagnosis was 3.14 years. On average, caregivers attended 7.71 sessions. We retained a 3-class model: High Attendance, Low Attendance, Intermittent Attendance (BIC = 724.75, AIC = 621.34, Entropy = .90). 49% were in the High Attendance Class, 19% in the Low Attendance Class, and 32% in the Intermittent Attendance Class. Members of the Low Attendance Class had lower likelihood (29%) of joining the first session after intake (i.e., Week 2), and attendance was consistently low throughout the sessions. The probability of attending sessions stayed relatively high across the 18-weeks in the High Attendance Class. Members of the Intermittent Attendance Class were more likely to attend the first session after intake (56%), compared to the Low Attendance Class, and their probabilities of attending sessions dropped after Week 6, with periodic increases every two or more weeks (See Figure 1). Participants who were employed had a higher probability to be in the Low Attendance Class, whereas those who were stay-at-home caregivers were more likely to be in the High Attendance and Intermittent Attendance Classes. No child and caregiver characteristics were associated with attendance.

Conclusions: Findings can inform strategies for retaining caregivers in interventions for families of autistic children. Caregivers who are less likely to participate the initial intervention session after the intake have poorer “prognosis” for attending any sessions and are more likely to no show/cancel. Supports may be needed for buy in at initial sessions (e.g., intake). For caregivers in the Intermittent Attendance group, whose probability of attendance dropped after first five weeks of intervention, critical materials may need to be addressed earlier in the intervention.
and child public health insurance on parent outcomes. The study relied on this nationally representative dataset to construct point estimates and conduct a series of multivariate regression analyses to quantify these differential and interactive effects.

Results: Question 1 - Parents of children with ASD and ASD/ID who used public insurance, were found to have 3.9- and 7.4-times higher odds of poorer health, respectively. These findings were significant and denote medium to large effects. Question 2 - Parents of children with ASD and ASD/ID using public health insurance experienced significantly higher odds of workforce exclusion, with odds ratios of 1.6 and 2.5, respectively, denoting small effects. Additionally, parents of children with ASD experienced 4.3 times higher odds of unemployment, denoting significant, medium effects.

Conclusions: Parents of children with ASD and ASD/ID face inequities. These findings have direct policy and programmatic implications, suggesting parents whose children access public health insurance programs may have additional family support needs that are important to consider. Future research is needed to further understand these parental experiences and how they effect the family unit.

402.103 (Poster) Investigation of Internalized Stigma Perception, Social Support, and Family Functioning in Parents of Children with Neurodevelopmental Disorders

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Background: Neurodevelopmental disorders such as Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD), and Intellectual Disability (ID) are conditions that create significant challenges not only for children but also for parents. Stigma is among the crucial difficulties experienced by the parents of these children. In addition, it is known that experienced stress and psychosocial difficulties have the potential to impair family functionality. In addition to the difficulties that mental disorder brings to the individual, all these difficulties experienced by families show the importance of family-based approaches in treatment and direct intervention to the individuals.

Objectives: In this study, we aimed to evaluate the internalized stigma perception, social support level, and family functionality of the parents of children with ASD, ADHD, and ID and to compare the results with those of children with typically developing (TD). It was also among our aims to examine the relationship of our findings with the psychosocial difficulties experienced by children.

Methods: This study was carried out in the Child and Adolescent Psychiatry outpatient clinic after obtaining approval from the Eskişehir Osmangazi University Faculty of Medicine Clinical Research Ethics Committee. A total of 163 cases diagnosed with Attention Deficit and Hyperactivity Disorder, Autism Spectrum Disorder, and Intellectual Disability according to DSM-5 diagnostic criteria were included in the study (ADHD:41, ASD:44, ID:40, TD:38). Parents were asked to fill out Sociodemographic data form, Parents' Internalized Stigma of Mental Illness Scale, Multidimensional Scale of Perceived Social Support, Family Evaluation Scale and Strengths and Difficulties Questionnaire.

Results: The perception of internalized stigma was significantly higher in the parents in the ASD group compared to the ADHD and ID (p<0.05). It was found that parents in the ASD and ID groups had a lower perception of social support compared to the other groups. While the family functionality level was higher in families with children with TD, there was no significant difference between Neurodevelopmental Disorders. The psychosocial difficulties experienced by the child were only significantly related to the internalized stigma perception in the parents in the ID group. Finally, a significant negative relationship was found between the psychosocial difficulties experienced by children with ASD and parents' perception of social support.

Conclusions: The result of this study that families in the ASD diagnosis group have a higher level of stigma perception compared to other neurodevelopmental disorders indicates the negative impact of this disorder on the family. Low perception of social support and family functionality also show the importance of parent-oriented intervention programs in children with neurodevelopmental disorders. Future research should focus on developing interventions that will help remove the stigma and increase social cohesion and functioning among the parents of these children.

402.104 (Poster) Caregiver Perspectives on Participating in Pediatric MRI Research

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Background: Given its potential to relate structural and temporal patterns of activation in the brain to behavior, neuroimaging methods have been increasingly utilized to investigate typical and atypical brain development. In fact, longitudinal studies of brain development have the potential to provide insight into neural mechanisms underlying various developmental disabilities, such as autism spectrum disorder (ASD). However, in contrast to studies of adults and school-aged children, neuroimaging studies of infants face additional challenges acquiring high-quality usable data, which often requires infants to be scanned during natural sleep. Although MRI is a safe and non-invasive imaging technique, the prospect of caregivers enrolling their infants in clinically unnecessary MRI can be overwhelming. Additionally, since the
commitment to participate in longitudinal MRI research can be demanding, there is often participant attrition which poses additional challenges to longitudinal work. Given the challenging nature of pediatric neuroimaging research, efforts aimed at minimizing participant attrition while maximizing useful MRI data collection are crucial.

Objectives: The objective of this study is to elicit caregiver feedback through the use of focus group interviews about their experience participating in our longitudinal infant MRI study at the Marcus Autism Center. Our goal is to better understand how we can revise our current protocols for infant neuroimaging studies to improve enrollment, data acquisition and lower participant attrition rates.

Methods: 13 caregivers were recruited from a group of caregivers who completed a longitudinal infant MRI study at the Marcus Autism Center. The infants enrolled in the MRI study were either at low or elevated likelihood for ASD. Three focus groups were conducted (3-5 caregivers per group) where a semi-structured interview was used to elicit caregiver feedback about their experience participating in MRI research, suggestions for infant MRI protocol improvement, and why they chose to participate in the research. Focus group interviews were transcribed and hand-coded to identify emerging themes from the focus group responses.

Results: Overall, caregivers recalled a positive experience in participating in our longitudinal infant MRI study and, if given the opportunity, would participate again. Caregivers also provided feedback that will allow for improving recruitment strategy, study materials, and study protocols. Caregivers reported experiencing anxiety around whether or not their infant would be able to successfully complete the entire MRI protocol and provide usable data. Contributing to science was the most common motivation for the caregivers to participate in research.

Conclusions: Our findings provide critical insight into the experience of participating in infant MRI research from the caregiver point of view, which will allow researchers to improve participant experience in the field of infant neuroimaging.


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Background: Substantial research finds that racially/ethnically diverse children are less likely to receive evidence-based treatments (Baio et al., 2018; West et al., 2016). Limited access to healthcare, insurance, providers, interpreters, and transportation contributes to these disparities (Dababnah et al., 2018; Windham et al., 2014). Low socioeconomic resources may further exacerbate these challenges for families of children with autism (Park et al., 2002). Training parents on naturalistic, developmental, and behavioral intervention (NDBI) strategies can be a cost-effective method to address the needs of children with autism, especially among low-resource communities (Gerow et al., 2018). However, to date, there is limited research on caregivers’ use of NDBI strategies, particularly from racially/ethnically diverse and low-resource communities.

Objectives: The aim of this study is to assess and compare caregiver use of NDBI strategies as measured through self-report and observation.

Methods: Caregivers were recruited to participate as part of a larger, ongoing study examining the efficacy of a parent-mediated intervention. In this study, we present data from the baseline assessment. Caregivers were eligible to participate if they had a child between 18 months and 6 years of age, the child had an autism diagnosis or screened at elevated likelihood for autism, and the family met low-resource criteria (i.e., Medicaid, the primary caregiver had a high school or lower education, household income <=200% federal poverty level). Caregiver use of NDBI strategies was measured via self-report and through the Measure of NDBI Strategy Implementation: Caregiver Change (MONSI-CC; Vibert et al., 2020). The MONSI-CC captures caregiver use of NDBI strategies through behavioral coding from a caregiver-child interaction. Additional measures included child challenging behavior, child autism symptoms, parenting stress, and family quality of life. All measures were available in English and Spanish.

Results: Preliminary analyses were conducted with data from 61 families of children with DD. Most parents/caregivers were reported to be Hispanic/Latino (85.2%), were foreign-born (77.0%) and were primarily Spanish-speakers (67.2%). Children were, on average, 3.89 (1.22) years of age, primarily male (75.4%), and mostly born in the United States (91.8%). Most children had an autism diagnosis (88.5%), followed by speech delay/speech-language impairment (18.0%) and developmental delay (8.2%). Pearson correlation analyses showed that caregiver confidence in using NDBI strategies (setting the stage, turn-taking, communication temptations) was associated with greater family quality of life, all p’s < .05. Increased confidence in setting the stage for child learning and following the child’s lead were associated with lower autism symptoms (Social Communication Questionnaire – Current; p’s < .05). Additional analyses will compare the frequency of NDBI strategy use across self-report and observation (MONSI-CC) and identify child, caregiver, and family-level factors associated with NDBI strategy use.

Conclusions: This study evaluates caregiver use of NDBI strategies in a sample of racially/ethnically diverse caregivers who reside in low-resource households. We find that caregiver confidence in using NDBI strategies is associated with family quality of life and autism.
symptoms. The results of this study will help inform caregiver training approaches to ensure more equitable access to evidence-based support for children with autism.

402.106 (Poster) Caregiver-Reported Profiles of Child Functioning for Children with Developmental Delays and Disabilities Twenty Months after the Onset of the COVID-19 Pandemic

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Background: There has been ongoing concern about the effect of the COVID-19 pandemic on children and youth. We previously identified heterogenous profiles among children and youth with developmental delays and disabilities (DDDs), including autism, three months after the pandemic began (Yusuf et al. 2022). Among those was a resilient profile where there were consistent improvements or stability across functioning domains. This resilient profile was more likely with greater parenting self-efficacy and ease in accessing schooling. As the COVID-19 pandemic continues into its third year, individuals’ functioning may fluctuate. Emerging evidence among adults suggests heterogenous profiles one year after the start of the COVID-19 pandemic (Liang et al. 2022). The course of functioning throughout the COVID-19 pandemic and its predictors among children and youth with DDDs is unknown.

Objectives: To identify patterns of functioning 20 months post-pandemic onset and examine prospective associations with child age, gender, baseline parenting self-efficacy, and access to schooling among children with DDDs.

Methods: As part of the UNICEF-WHO Global Report’s initiative to document experiences of caregivers of children with DDDs globally, we administered an online survey across Canada twice: at baseline (June-July 2020) and follow-up 20 months post-pandemic onset (November-December 2021). To identify classes of functioning 20 months post-pandemic onset, we subjected caregiver-reported changes on 12 domains of functioning at follow-up to latent class analysis. We assessed prospective associations between patterns of functioning at follow-up with candidate predictors measured at baseline: child age and gender, parenting self-efficacy and access to schooling, using multinomial logistic regression.

Results: We identified four classes of functioning 20 months post-pandemic onset (n=305). The first was a class exhibiting zero probability of improving across domains (n=81), named ‘Worsening’. The second class showed zero probability of either improving or worsening (n=42), named ‘Stable’, and a third ‘Mixed’ class showed a 20-30% chance of worsening or improving (n=108). Finally, we identified a class showing moderate chance of worsening or not changing on all domains except for mental health, sleep, and sensory issues, which showed high probability of improvement, (n=73), named ‘Domain-Specific Resilient’ (DSR). Older children were more likely to belong to the DSR than the Worsening class (OR=3.09, p=.001). Females were more likely than males to belong to the DSR, Stable, and Mixed classes (ORs≥2.25, ps≤ .012). Higher parenting self-efficacy at baseline was associated with greater likelihood of belonging to the DSR, Stable, or Mixed classes (ORs≥1.74, ps<.001). Membership in the DSR class was more likely for those reporting easy access to school at baseline, (OR=3.67, p=.016), and less likely when there was difficulty accessing school at baseline (OR=0.27, p=.001), compared with those whose school access was neither easy nor hard at baseline.

Conclusions: Our findings indicate that older age, female gender, greater parenting self-efficacy and easier access to school early in the COVID-19 pandemic are associated with potential long-term resilience in children with DDDs. We highlight the importance of parenting self-efficacy and access to schooling as modifiable factors that could promote long-term resilience in the context of adversities such as the COVID-19 pandemic.

402.107 (Poster) Co-Production of a Research Training Protocol for Autistic Community Partners


Background:

Patient-centered initiatives and approaches call for the inclusion of individuals with lived experience as partners in all phases of the research process. Most Autistic individuals who have participated in research, even in an advisory capacity, are rarely included in all aspects of a project as equal partners. Providing community partners with more research knowledge and skills will enhance their engagement throughout the research process.
Objectives:

Develop and pilot an adapted multi-modal, training curriculum on the basics of research to increase research skills and knowledge among Autistic adults with different support needs.

Methods:

Through a Community Based Participatory Research (CBPR) approach, a team of 7 Autistic and 4 non-autistic research partners collaborated in the co-production and piloting of the training course which focused on 1. What is Research, 2. Ethics in Research, and 3. How to be a Community Partner. All team members were involved in every step of the curriculum development through an iterative editing process until a final version was created. Accommodations were provided to ensure optimal participation. A local service agency that supports adults with developmental disabilities hosted the training and their staff were consulted during the course development. Training course participants were recruited among their clients and agency staff provided support. An Autistic instructor from the research team delivered the training and non-autistic members served as logistical and breakout group support during training exercises. All research team members, training participants, and agency staff were compensated for their time.

Results:

Autistic collaborators contributed the original idea, concepts, appropriate language, examples, scenarios, and instruction. After 6 months of development and refinement, a 3-unit virtual course was completed. Consisting of 2 hours of group instruction and in-class exercises, each unit was delivered online during 3 consecutive weeks to 12 Autistic participants of varying ages and support needs. Accommodations were provided such as individual classes when group instruction was unsuitable, make-up classes, text reminders before instruction, and class materials sent in advance with notes from the previous class. All participants completed the course and provided positive feedback; agency staff highlighted the culturally appropriate content and presence of an Autistic instructor as key elements for its success. Research team members are continuing to work together to create a final version of the research basics training for wide distribution.

Conclusions:

A team of Autistic and non-autistic researchers collaborated in the production of a 3-unit training aiming to build research knowledge and skills among Autistic adults in the community. Starting from a topic of importance to the Autistic community, an inclusive team in which all collaborators worked as equal partners, developed a culturally appropriate curriculum that was piloted successfully in a community setting. The voices of Autistic adults are vital in deciding research topics that represent their interests and should receive priority attention. Expansion of the training will facilitate Autistic people having a greater voice in the research process and shaping research priorities.

**402.108 (Poster) Collaborative Development of Culturally Appropriate Resources for Parents of Individuals with Autism**

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Background: Research indicates that disparities in access to services and quality of resources is not new for minority ethnic groups. Latinx parents report higher unmet needs and worry about receiving resources in their native language (Magaña et al., 2013; Zuckerman et al., 2014; Blanche et al., 2015). Ethnic minority families are also less likely to receive high quality, evidence-based services and interventions. Importantly, these quality indicators have been found to mediate the utilization of services (Parish et al., 2012). Researchers have found that minority families in particular have difficulty understanding the autism diagnosis and appropriate services and interventions. Blanch et al. (2015) interviewed Latinx parents who had a child diagnosed with autism and discovered they identified different stressors than non-Latino parents including understanding autism, having to independently research autism, and having to explain the diagnosis to family members. By educating parents and other stakeholders about evidence-based practices, they can better advocate for their children and appropriate services.

Objectives: The purpose of this study was to identify the needs of parents and caregivers of individuals with autism from underserved, linguistically diverse communities to inform the adaptation and development of autism resources.

Methods: Informed by county data on the primary languages spoken by consumers served by the developmental disabilities system, parents and caregivers who spoke Spanish (n=7), Vietnamese (n=4), and Tagalog (n=3) were targeted to participate in focus groups. Three focus groups were conducted, one for each language group. Focus group questions asked about 1) the types of resources for autism they access, 2) barriers and facilitators to accessing resources, 3) whether resources considered their linguistic and cultural needs, and 4) additional resources needed Thematic coding was utilized to identify main themes.

Results: The main themes that emerged from the focus group data indicated that parents and caregivers needed more guidance about service systems and information about autism. Participants also discussed accessibility of resources, indicating videos are a preferred mode of dissemination. Given the information gathered from the focus groups, a series of videos on navigating different service systems (e.g., early intervention, school, developmental services) were adapted and translated into each target language. These videos include an
overview of the service system, eligibility criteria, role definitions, review of important terms such as “IEP”, and steps on how to get started with services.

Conclusions: This project allowed for the development of accessible resources tailored for linguistically diverse populations through informed feedback from stakeholders. Materials are free to access on the California Autism Professional Training and Information Network (CAPTAIN) website. Partnering with CAPTAIN has allowed for the dissemination of these resources through their network of family resource centers, maximizing the reach of resources.

402.109 (Poster) Committing to Collaboration: Participatory Approach to Developing Game Design and Employment Workshops for Autistic Youth

Background: Autistic people often face barriers obtaining meaningful employment (Burgess & Cimera, 2014; Shattuck et al., 2012). Although not all autistic people are interested in STEM fields (Cheriyan et al., 2021), some have STEM interests and strengths that are well aligned with workforce needs (Bureau of Labor Statistics, 2015; Krzeminska, & Hawse, 2020; Murray & Lesser, 1999). Through collaboration with a participatory team of neurodivergent students and a technology education not-for-profit, we have been iteratively developing a game design and employment skills workshop for autistic youth.

Objectives:

1. Describe a participatory approach to developing workshop learning objectives (LOs).
2. Outline challenges honoring participatory directives.
3. Identify instructional strategies that engage autistic youth.
4. Assess outcomes of workshop participation.

Methods: 22 of 23 participants (M = 16.82, SD = 2.24) completed a screener, pre-, and post-workshop assessments. Participants were screened for interest in workshop topics and basic tech skills (e.g., navigating Zoom). In the screener and pre-assessment survey, participants rated interest in potential LOs. For post-assessment, students rated workshop gains with regard to LOs. Pre- and post-workshop, participants completed surveys measuring self-determination, video game design and career decision-making self-efficacy (See Table 2). Students also rated their engagement during select workshop activities (See Table 1). A pre-registered alpha level of .01 was used for all analyses.

Results:

LOs the participatory team rated as important often aligned with participants interest ratings. However, the participatory team critiqued a LO rated highly by incoming students, “appropriate workplace behaviors”. This LO was revised to “workplace dynamics” to avoid encouraging normalization. Nevertheless, normalizing language and goals (e.g., pushing students to adapt to “norms”) emerged in the workshop. Although an autistic researcher and others coached staff to use neurodiversity-aligned approaches, the recurrence of these approaches demonstrates a need for additional training next year.

At the midpoint and end of the workshop, participants collectively reviewed and gave feedback on their engagement ratings, leading to curriculum adjustments (e.g., adding more games). On the final day, many students reflected that their feedback led to improvements in the workshop.

Pre-workshop interest in learning specific topics was sometimes associated with student-reported engagement in workshop activities. For example, pretest interest in learning to create websites and troubleshooting were positively associated with engagement in working on a personal website/development log (ps<.006).
Results showed a trend toward structured collaborative activities being rated more engaging than unstructured collaborative activities (ps≤.04). There was no evidence that combined game design and employment activities were more engaging than game design or employment only activities (ps>.21).

Participation in the workshop was associated with improvements in game design self-efficacy (p=.004) but no improvements in career self-efficacy and self-determination (ps>.07; See Table 2).

Conclusions: Findings reflect how workshops relating to employment and STEM fields can address barriers to meaningful employment for autistic people. Future workshops should incorporate engaging, collaborative, and neurodiversity-aligned activities for participants to hone their individual and employment skills. We hope autistic people’s employment outcomes in STEM and other settings would thereby improve.

402.110 (Poster) Communication Skills and Executive Functioning in Children with Autism without Intellectual Disability. Relationship with Parenting Stress


Background: Research evidence that parents of children with autism without intellectual disability report significantly higher levels of stress and report negative experiences compared to parents of typically developing children (Davis & Carter, 2008). Parenting stress depends on a set of risk factors including individual characteristics of children with ASD, such as autism symptoms severity, behavioral problems, communication deficits or problems with daily life executive functioning (EF). Difficulties on communication skills, specifically pragmatic language in children with high functioning autism and executive dysfunction are important parents’ concerns. EF deficits have been found in children with ASD, and executive impairments are suggested to be associated with their language difficulties (Apperly et al., 2009). Little is known about the relationship between these child domains and parenting stress in ASD.

Objectives: this study aims to examine the relation between parental stress and children ‘domains such as communication abilities and daily live executive functioning in autism spectrum disorder without intellectual disability.

Methods: The participants of this study were thirty-six families (N = 36) of children with an autism diagnosis, aged 7 to 11 years (M = 8.8; SD = 1.4). Thirty-three of the children were boys (91.6%) and their intellectual functioning was within the normal range according to the scores of the Kaufman Brief Intelligence Test (K-BIT). Families were recruited through specialized centres from Spain. Children had received a clinical diagnosis of ASD in neuropsychiatric services based on Diagnostic and Statistical Manual of Mental Disorder criteria (DSM-IV-TR; or DSM-V); the Autistic Diagnostic Interview— Revised (ADI-R) and the Autism Diagnostic Observation Schedule-WPS (ADOS-WPS; Lord et al., 2000). The vocabulary subtest from the WISC-IV had an average of 13.3 (SD = 4.1). Parents, mostly mothers completed the Parental Stress Index (PSI), the Children's Communication Checklist (CCC-2) and the Behavior Rating Inventory of Executive Function, Second Edition (BRIEF-II).

Results: The results of Pearson correlation analyses evidenced statistically significant associations between parent child interaction stress domain and pragmatic communication abilities, emotional regulation index and behavioural regulation index from BRIEF-II. Additionally, the multiple regression analysis conducted revealed that the emotional regulation index was the only significant predictor of parental stress, and specifically of the child-parent dysfunctional interaction.

Conclusions: The findings suggest that executive dysfunctions in daily life in children with autism are an important factor to consider in addressing parental stress. In addition, the results could support the possible mediating role of communication deficits in executive functions suggested by some studies (Joseph et al., 2005). Therefore, there is a need for further research about the impact of deficits in cognitive flexibility and emotional control, in parental stress to improve the parent-child interactions.


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Background: Most children with autism and other developmental disabilities live in low- or middle-income countries. With the focus shifting from mere survival to being able to thrive there is an impetus to study the quality of life of children with developmental disabilities and their families.

Objectives: To explore the relationship between caregiver-reported quality of life and disability weights associated with their child’s condition in families with children with a developmental disability or a physical health condition in Ethiopia.

Methods: Participants were recruited in two outpatient paediatric and child mental health clinics in Addis Ababa. Complete data was available for 241 caregiver-child dyads (mean age child = 4.8y, 35% girls; mean age caregiver = 34.4y, 82% female). Diagnostic information was derived from the child’s medical records, supplemented by information received from the caregiver based on responses to questionnaires assessing the child’s developmental level (Autism Treatment Evaluation Checklist, ATEC; Borissov et al., 2021) and communication (the Communication Profile-Adapted; Ceccharelli et al., 2021). A total of 139 children had a developmental disability diagnosis including autism, intellectual disability, attention deficit hyperactivity disorder and developmental language disorder. 102 children had a physical health condition, including amongst others diagnoses of respiratory tract infections, malnutrition and Human Immunodeficiency Virus (HIV). Based on the available medical and caregiver-reported information, disability weight scores (a measure of health loss developed by the Global Burden of Disease study team) were estimated for each participating child. Caregiver quality of life was assessed using the Pediatric Quality of Life Inventory™ (PedQL™), Family Impact Module, validated for use in Ethiopia (Borissov et al., 2021).

Results: The quality of life of caregivers of children with developmental disabilities was significantly lower compared to caregivers of children with a physical health condition (p < 0.001; see Table 1). Group differences remained significant after controlling for caregiver education, caregiver age and gender, and child age and gender. Mean disability Weight Scores in the developmental disability group were higher than for the physical health condition group (p < 0.001), indicating greater health loss. Disability weight scores correlated negatively with quality of life in the total group (β = -0.17, p = 0.007; see Figure 1). However, this association was no longer significant when explored within the developmental disability or physical health condition groups separately.

Conclusions: Caring for a child with a developmental disability in Ethiopia has a pronounced effect on family functioning and is associated with substantial reduction in quality of life compared to families caring for children with physical health problems. Support for children with developmental disabilities is often underfunded compared to care for physical health conditions, especially in resource-constrained contexts. Development and scale-up of this support should be prioritised.

402.112 (Poster) Comparing Stress and Coping in Mothers and Fathers of Children with Autism Spectrum Disorder
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Background: Parents of children with autism spectrum disorder (ASD) experience major impacts in the family and it is commonly reported that mothers experience greater stress and more difficulty coping in comparison to fathers, although fathers are often underrepresented through small sample sizes in research. The Parenting Stress Index – Short Form (PSI-SF) and the Family Crisis Oriented Personal Evaluation Scales (F-COPES) are widely used measures in the literature. However, a recent factor analysis suggested that the subscales of these measures may not be as psychometrically sensitive for parents of children with ASD and proposed a new set of subscales (Shine, 2021), but research has yet to utilize these factor structures.

Objectives: The current study investigated differences in parenting stress and coping experiences between mothers and fathers of children with ASD using a large community-based sample, and compared results using factor structures of the PSI-SF and F-COPES as published by their authors and as suggested by Shine (2021).

Methods: The current study is a secondary analysis of archival survey data collected from mother-father dyads (n = 810 dyads for the PSI-SF, n = 692 dyads for the F-COPES) of children with ASD who received clinical assessments at a public agency in Toronto, Ontario, Canada. Children (84% male) ranged in age from 18-83 months (M = 43.83, SD = 13.39). The PSI-SF and F-COPES scores for mothers and fathers were compared using the original subscales and Shine’s (2021) factor models.

Results: Paired samples t-tests were conducted to compare mothers and fathers across PSI-SF and F-COPES subscales. Scores were generally similar between mothers and fathers as well as between factor structures, with significant differences indicating less favourable scores for mothers. More specifically, mothers reported experiencing greater general distress than fathers in both Shine’s (2021) factor model (t(799) = 4.58, p = .001, d = .16) and the original model (t(801) = 4.58, p = .001, d = .18). Mothers also reported greater difficulty managing their child than fathers (t(787) = 4.63, p = .001, d = .17). Additionally, mothers reported a greater use of general social supports than fathers with the original model (t(673) = 2.95, p = .003, d = .11). Shine’s (2021) model found similar gender differences for mothers’ greater use of friends/family supports (t(675) = 3.21, p = .001, d = .12), but no gender differences were found for social support from neighbours (t(669) = .95, p = .34, d = .04).
Background: Understanding consumer satisfaction with interventions for children with autism spectrum disorder (ASD) is critical. Acceptability influences uptake and engagement, and is central in delivering client-centered care. Qualitative methodology assesses satisfaction and usability of ASD-focused programs, but it is susceptible to investigator biases, which can present challenges when analyzing data that emerge from diverse families. Sentiment analysis is an alternative, used to identify patterns among marketing and customer service initiatives, such as analysis of customer reviews and social media posts. There are few applications among clinical medicine, and those published in the scientific literature have not addressed satisfaction after participating in clinical trials. Opportunity is ripe to explore how data analysis findings may differ across these two well-established analytic techniques.

Objectives: Use qualitative and sentiment analysis to identify themes among satisfaction survey data from caregivers who participated in a family-navigation program post ASD diagnosis. Compare themes gleaned from each of these approaches.

Methods:

Program satisfaction data (N=76) were collected as part of an exit satisfaction survey to a program (Mind the Gap; MTG) for caregivers following a developmental disability diagnosis. Qualitative researchers conducted latent content analysis using NVivo software. Upon completion of latent coding and consensus coding, a researcher created higher-level categories of the basic codes. Categories were reviewed and agreed upon with a second researcher.

Machine learning (ML) approaches analyzed caregiver responses in R. A term document matrix provided visualization, as well as term frequency and lower correlation limits, and in order to calculate sentiment (overall positivity/negativity in responses). A coder reviewed the most frequently used terms and which words were most highly correlated with them in order to identify themes.

Results:

Caregivers identified positive aspects of the MTG intervention: coach characteristics, provision of specific and relevant information, program organization and characteristics, and creation of a community. While the majority of caregivers stated they did not have any additional suggestions for the program, several provided ideas: provision of additional types of information, changes in coach assistance or coach-parent contact, and changes in the organization and requirements of the intervention.

Qualitative responses were calculated as generally positive through sentiment analysis, even among the area of suggestions. Caregivers shared that the best parts of the program included the availability of information, the partnership with their peer coach, and the help to their family. The main suggestion of the program was to customize the number of meetings and amount of time in the program to fit individual family needs.

Conclusions: ML approaches can enhance traditional qualitative coding methods, as they may help quickly identify commonly occurring terms and correlations to other words that help identify themes. These approaches may allow for a more nuanced exploration of terms and themes among participant qualitative responses. Traditional qualitative analyses still serve as an important step in interpreting high-context communication that requires deep cultural or technical understanding. A combination of both methodologies (beginning with a ML approach, followed by modified, traditional approach that elucidates unclear data) will result in a more robust understanding of qualitative data.
Background:

Parents of infants at elevated likelihood of autism (EL-A) demonstrate more parenting stress than parents with typically developing children, especially due to sensory hyperresponsiveness (Ben-Sasson et al., 2013; DesChamps et al., 2020; Kirby et al., 2015). Because parenting stress is associated with reduced response to parent-mediated interventions and elevated child externalizing behavior problems (Moreland et al., 2016; Osborne et al., 2008), it is important to effectively measure parenting stress to intervene with families demonstrating clinically significant stress. There are several parent-report questionnaires used to examine parenting stress, including the Parental Stress Scale (PSS). The PSS is written at a 7th grade level, making items easily accessible. Additionally, this scale includes only 18 items, requiring 5-10 minutes to complete. These attributes of the PSS make it attractive for use in research; however, the underlying factor structure is unclear due to several analyses demonstrating differing results. The original factor analysis identified four factors (Berry & Jones, 1995); however, a two-factor model was a better fit for these data in a community sample of infants at EL-A (data collected from 2010-2014; Watson et al., 2017). The two-factor structure is useful due to its parsimonious nature and ease of interpretation for clinical and research purposes.

The prevalence of high parenting stress has changed over time, primarily due to an increase in technology use, which may yield differences in the psychometric properties of the PSS in a later birth cohort. Technology use in everyday life has increased (Statista and The Next Web, 2019), and interference of technology in family interactions is associated with more child externalizing behaviors and later higher parenting stress (McDaniel & Radesky, 2018).

Objectives: To explore whether the two-factor structure of the PSS demonstrates invariance across two birth cohorts approximately 5 years apart.

Methods: The new sample of infants are similar to the Watson et al. (2017) sample in geographic location, identification, and recruitment processes, allowing for comparative analyses across birth cohorts. Data on the PSS was collected in both samples at baseline of larger longitudinal intervention studies. The new participants are a community sample of parents (n=39) of 11-16-month-olds at elevated likelihood of autism based on a screening questionnaire at baseline of a longitudinal intervention study. We conducted a differential item functioning (DIF) analysis to examine the invariance of the two-factor model across cohorts.

Results: Results of invariance testing at the metric, configural, and scalar levels were non-significant (p = 0.65, 0.40, and 0.17, respectively). Chi-squared test of model fit ($\chi^2 = 348.4, p<.001, df = 228$), RMSEA (0.087), and CFI (0.81) indicate adequate model fit for an invariance testing model.

Conclusions: The two-factor structure of the PSS was invariant across birth cohorts, suggesting that this parsimonious scoring of the PSS may still be useful, even in the face of changing sources and types of parenting stress across time.

402.115 (Poster) Contributors to Family Life Impairment for Families of Young Autistic Children

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Background: Families of young autistic children tend to report greater impairment on broad measures of family outcomes than those without family members with autism spectrum disorder (ASD). However, the mechanisms underlying family life impairment in this population are not well known. Identifying contributors to family life impairment above and beyond having an autistic family member can help researchers and clinicians develop appropriate, supportive interventions across a range of domains to more holistically enhance family life.

Objectives: The purpose of this project was to investigate potential correlates of family life impairment above and beyond ASD characteristics in families of young autistic children in an effort to identify practical targets for family interventions.

Methods: Cross-sectional data were collected from 564 parents of autistic children aged 2 to 5 years ($M = 4.23$), who participated in an online study. All participants provided basic demographic information in addition to completing all study measures (See Table 1). A series of stepwise multiple linear regression models were generated to examine whether child emotional reactivity, child dysphoria, child verbal ability, child flexibility, child sleep problems, and parent depression were associated with family life impairment across five domains: total
impairment, family impairment, parent impairment, childcare impairment, and positive growth. All models controlled for child age, sex, race, and ethnicity as well as family income and whether parents had a parenting partner.

Results: Table 2 shows the results of multiple linear regression analyses. ASD characteristics were significantly associated with total impairment and childcare impairment but not with family or parent impairment. Higher emotional reactivity, more sleep problems, less flexibility, lower verbal ability, and greater parent depression were associated with greater total family life impairment. Lower verbal ability, higher reactivity and dysphoria, and less flexibility were associated with family impairment. More sleep problems and parent depression were associated with parent impairment. Lower verbal ability and less flexibility were associated with greater childcare impairment. None of the variables were significantly associated with positive growth.

Conclusions: Families of autistic children generally report greater impairment, but it is not necessarily the characteristics of ASD that drive this phenomenon. Rather, the findings of this study point to other predictors of family life impairment and suggest new avenues through which families might be supported. Associations identified between child verbal ability and flexibility and various aspects of family life impairment suggest that providing additional support in assistive or augmented communication and establishing family routines may be beneficial. Development of interventions targeting child emotion regulation, child sleep issues, and parent depression may also be practical mechanisms through which to reduce family life impairment. Finally, more attention should be paid to childcare policies and providing parents with childcare options that embrace and are sensitive to the unique needs of autistic children. The findings of this study offer further insight into the experiences of families of autistic children and offer researchers and clinicians more nuanced ways to address impairment across different domains of family life.

402.116 (Poster) Conversations with Researchers: Practices Promoting Increased Inclusivity Among Research Participants
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Background: Recruitment practices tied to traditional systems result in traditional participants - members of the dominant culture (e.g., White, upper-middle class, college-educated). Parent-Implemented Intervention (PII) studies with traditional participants report significant measurable outcomes for children with Autism Spectrum Disorder (ASD) and their caregivers. Such outcomes reinforce continued adherence to traditional systems. This qualitative interview study sought to understand how these systems increase or decrease participant inclusivity and focused on 1) understanding systems influencing researchers’ engagement recruitment, 2) how these systems directly/indirectly impact participant inclusivity, and 3) highlighting practices supportive of increased participant inclusivity.

This study is rooted in the idea that, globally, marginalized populations who have historically experienced systemic racism in the form of micro- and macro-aggressions based on their ethnic, socioeconomic or linguistic identities stand to benefit from researchers implementing inclusive recruitment practices.

Objectives: include 1) highlighting recruitment practices systematically offering support for diverse families, 2) encouraging researchers to reflect upon specific practices making recruitment of diverse families a priority when designing future studies, and 3) discussing strategies to foster communication between diverse families and researchers with the intent to develop culturally-responsive practices promoting increased participant inclusivity.

Methods: were designed intentionally to support PII research becoming more accessible and responsive to diverse families’ unique concerns and needs. A literature review was conducted to situate the research questions, an interview protocol was designed to support consistency and thematic analysis, deductive coding was used to identify commonalities among responses, and inductive coding was completed to create a set of culturally responsive recruitment practices intended to meet the needs of marginalized communities who have been systematically excluded from previous research.

Nineteen researchers (principal investigators) self-identified as 15 White females, three White males, and one Asian female, with experience conducting research ranging from 12-35 years at institutions across the United States, Ireland, and Australia were interviewed via Zoom.

Results: include 1) giving researchers space and structure to reflect on previous experiences with recruitment resulted in considering how to alter future recruitment to focus more intentionally on increasing inclusivity, 2) identifying how researchers who conduct studies with traditional participants are rewarded by traditional systems (i.e., funding, publication, and recognition), and 3) challenging traditional systems by constructing a set of culturally-responsive practices (see Table 1).

It is recommended that researchers 1) engage in consistent reflection within the larger research process (i.e., impact of exclusion criteria, creation/distribution of inclusive recruitment materials, 2) work with diverse families to update traditional systems based on identified concerns and supports, and 3) empower families to be active collaborators when designing future studies.
Conclusions: Caregivers from diverse backgrounds face unique barriers to participation in studies with the potential to positively impact their child’s development. Engaging in recruitment practices intended to support diverse families gain access to the benefits of intervention studies is a necessary step toward promoting equity in research. Implementing inclusive recruitment practices leads to old standards shifting toward targeted integration of diverse participants. Only then will all families have the opportunity to experience success.

402.117 (Poster) Cross-Cultural Comparison of Knowledge and Attitudes Towards Autism Among University Students in Hong Kong, the United Kingdom and the United States: A Mixed-Methods Online Study

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Background: The rise of the neurodiversity movement, advocating for equal rights for neurodivergent people, has brought about positive shifts in attitudes towards autism (den Houting, 2019; Kapp et al., 2013). However, research on autism and neurodiversity is largely based on Western samples. While prior studies comparing attitudes towards autism across cultures reported higher levels of autism stigma among university students in non-Western countries such as Lebanon, Japan and Malaysia (Obeid et al., 2015; Gillespie-Lynch et al., 2019; Someki et al., 2018; de Vries et al., 2020), there remains limited understanding of how cultural differences and values may influence knowledge and attitudes towards autism and neurodiversity in a predominantly Chinese society such as Hong Kong. Greater understanding of the intersections between autism and culture is needed to better inform interested parties’ discussions on neurodiversity and lead to more neurodiversity-affirmative and culturally-sensitive anti-stigma interventions.

Objectives: To compare, and determine predictors of, knowledge and attitudes towards autism and neurodiversity among university students in Hong Kong, the UK and the USA.

Methods:

361 university students were recruited online via university email lists and Prolific (119 from Hong Kong, 120 from the UK, and 122 from the USA).

On Qualtrics, participants completed three questionnaires measuring explicit stigma towards autism (as measured by the Social Distance Scale; Gillespie-Lynch et al., 2019), knowledge about autism (as measured by the Participatory Autism Knowledge Measure; Kim et al., 2021), and cultural orientation (as measured by the Cultural Orientation Scale; Triandis & Gelfhand, 1998). Following this, participants answered four open-ended questions on autism and neurodiversity. They were then directed to the Gorilla.sc platform to complete an Implicit Association Test (IAT; Jones et al., 2021), which measured implicit stigma towards autism.

To compare knowledge and stigma across countries, a Multivariate Kruskal-Wallis test was conducted with Bonferroni-corrected Dunn’s post-hocs. Multiple linear regressions were run to identify factors contributing to knowledge and stigma.

Results:

1. While participants reported positive explicit attitudes towards autism, their implicit attitudes were negative.
2. There were significant main effects of country, p’s<.001, on knowledge and explicit stigma. Hong Kong participants reported less knowledge than in the UK and USA, p’s<.001, and more explicit stigma, p’s<.001. There was no effect of country on implicit stigma.
3. Greater autism knowledge was predicted by lower acceptance of inequality, p<.001, and postgraduate (vs. undergraduate) status, p<.05. Greater explicit stigma was predicted by more implicit stigma, p<.01, less knowledge, more acceptance of inequality, and more individualism, p’s<.05. No factors predicted implicit stigma.

Conclusions: Implicit attitudes towards autism were more negative and less cross-culturally variable than explicit attitudes. Cultural differences may influence knowledge about autism, and cultural values such as collectivism and acceptance of inequality may then contribute to explicit stigma towards autism. Further research is needed to identify factors influencing implicit stigma in order to better inform anti-stigma interventions.

402.118 (Poster) Decision-Making By Parents of Children with Autism Regarding Treatment

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Background: The diagnosis of autism in children can elicit a sense of a crisis among their parents as it can encompass complex feelings including contradicting emotions such as relief and grief along with a need for critical decision-making. From the moment autism is diagnosed, parents find themselves at a crossroads of making decisions concerning appropriate treatments for their child. This crossroad involves decisions resulting from the need to understand the consequences of the child's condition, selecting professionals to work with
their child, and choosing treatments. The preliminary search is accompanied by a sense of stress, grief, and emergency due to the understanding that early treatment is of critical urgency. Previous studies have focused on the moment of the diagnosis or the early years of the children, with limited research identifying the critical decision-making junctions that involve crisis and complex emotions. However, range of differences and complexity among individuals with autism, and the variability among treatments, as well as the evolving needs along the life span, create a complex and unique path for parents of children with autism. This path encompasses uncertainty that evolves around changes that shift along the life -long trajectory.

Objectives: The purpose of this study was to analyze critical decision-making junctions with an emphasis on the first junction immediately after diagnosis, followed by other critical moments in their parenting life, especially with reference to decisions made regarding treatment for their child across the trajectory.

Methods: Sixteen parents of children ages 2-20 were interviewed using naturalistic decision-making paradigm (NDM) interview qualitative method. This qualitative study was conducted based on critical-decision-making (CDM) theory. CDM is based on the understanding that real-life decision-making incorporates uncertainty and stress; and is complex and dynamic, thus dependent on the processes taken during decision making. Data analysis was based on theory and evidence-based research to establish categories and themes and create a critical decision-making model.

Results: Parental decision-making was influenced by many factors, arranged into several categories including problem identification, uncertainty and use of uncertainty reduction strategies, search, and use of resources, incorporating emotional and logical processes, and insights. Grief was incorporated into all levels of decision-making junctions with different levels and stages evolving over the trajectory.

Conclusions: Critical decision-making junctions appear at critical times over the trajectory portrayed in a spiral format that is influenced by many factors, incorporating various strategies over time. Recurring feelings of grief are experienced by parents demonstrating the spiral nature of the trajectory. Decision-making evolved over time, as parents shift and transition to become experts in making decisions for their child. Results of this study provide an insight into parental decision-making, and the spiral nature of the processes. Examples will be presented and discussed.

**402.119 (Poster) Design and Usability of mHealth Autism Screening Tools for Families Underserved in Autism Care: Parent Perspectives**

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Background: Families of color and/or low-income families experience autism inequities, including delayed diagnosis of ASD. Mobile health (mHealth; mobile or tablet-based device-based) autism spectrum disorder (ASD) screening apps have the potential to improve these inequities. Use of mHealth tools for screening and identification of ASD is gaining prevalence, bringing clear benefits such as video content, connections to community resources, and instant interpretation of results. However, it is unclear whether current mHealth ASD screeners will actually reduce disparities or help those already advantaged in autism care. Understanding the perspectives of parents is imperative in ensuring mHealth screeners meet needs of diverse families and thereby reduce autism diagnostic disparities.

Objectives: To conduct qualitative interviews and user testing of mHealth ASD screening tools in parents of children of color and/or of low-income children, in order to assess usability and acceptability of mHealth ASD screening tools in this population.

Methods: 16 parents were recruited to participate in the study. To be included, parents had to (1) be English and/or Spanish speaking, (2) be low income and/or a parent of a child of color, and (3) have a child with high or low risk of ASD. High-risk children were recruited from a university autism clinic wait list. Low-risk children were recruited from a general pediatrics clinic. We conducted brief telephone interviews to gauge parents’ general technology knowledge. We then conducted semi-structured qualitative interviews and in-person user testing, in which parents tested 1-2 mHealth ASD screening tools on their own mobile phone or tablet. Screening tools were selected based on a previous study assessing tools' scientific/clinical basis, functionality, usability, accountability, and accessibility (Sanders, 2022). Interviews and user testing were video-recorded, transcribed in the original language, and each transcript was coded by two study team members using QSR NVivo. Spanish transcripts were coded by bilingual team members. A phenomenological approach was used to develop key themes.

Results: Parents identified 4 themes and 11 subthemes describing benefits and challenges in using mHealth tools (Table). Tool Content included tool question wording, use of numbers/statistics, and general ease/difficulty understanding content. Tool design and function included user interface features, ease/difficulty navigating the tool, and time burden experienced by parents using the tool. Tool purpose and appropriateness included the relevance of the tool to the family’s context, and resources or next steps the tool provided. Tool acceptability included the parent’s first impression of the tool, perceived legitimacy of the tool, parents’ trust in the tool, and tool framing
of ASD. Parents suggested improvements such as reducing the reading level of text (making it easier to read), improved question wording to clarify response options, and making tools shorter to fit in parents’ daily lives.

Conclusions: Parent perceptions of ASD screening tools varied, and reflected challenges with content, design/function, purpose/appropriateness, and acceptability. Parents’ lack of familiarity with mHealth applications and ASD, lack of familiarity with the use of mobile technology, and lower literacy may undergird these challenges. Designing mHealth tools based on the needs of diverse parents may make improve equity and impact.

402.120  (Poster) Designing Autism Evidence-Based Practice Modules for Caregivers: Focus Group Analysis
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Background:

Research points to several known benefits of caregiver education. Caregivers spend the most time with their children and when taught to use evidence-based strategies during natural child and family routines, they can help increase exposure to these strategies to meet intensity of service needs. To date, an extensive body of research, as well as national and international policy initiatives, have highlighted the utility, practicality, and efficiency of parent education to address the developmental and behavioral difficulties of autistic children. However, despite the research-support for caregiver training, there is not yet a consensual tailoring framework in the field to evaluate appropriate, effective, and efficient caregiver training.

Objectives:

The current study aimed to ask caregivers of autistic children their perspectives on caregiver training. Specifically, we invited caregivers as a focus group to answer the following research question: what are the necessary components of caregiver training to help caregivers understand and advocate for effective autism interventions?

Methods:

Seven caregivers of autistic children were recruited and divided into two focus groups (group of four and three) according to their availability. A topic guide adapted from training modules for behavior technicians was used to guide the discussion. Each group spent two hours discussing needs, benefits and limitations of caregiver training led by a facilitator. Focus group discussions were recorded and transcribed verbatim. Participants also completed a demographic survey, the Maternal Autism Knowledge Questionnaire, and the Family Empowerment Scale.

Results:

Transcriptions from the two focus groups were analyzed using thematic analysis based on focus group methodology. Several broad themes emerged from the analysis: concerns for caregivers of newly diagnosed children, negative and positive experiences as caregivers of autistic children, advocacy, and suggestions for caregiver training. Specifically for caregiver training, participants expressed the need for parsed information (e.g., shorter durations and chunked information); caregiver-led choices (e.g., option to choose those related specifically to their child); specific video examples pertaining to the home setting; and a feedback loop (e.g., time for caregivers to digest the information and check-in with their service provider).

Conclusions:

By using focus group methodology, we were able to yield honest and often critical feedback from the caregivers on current caregiver training practices. Participants provided insights into practical solutions for enhancing the long-term effectiveness of caregiver training such as accessible and digestible segments (i.e., 10-minute videos); time in between sessions for caregivers to reflect on and test out learned content; and interactive options to select topics specific to their child. Caregivers also voiced concerns about the intensity of some interventions and the fear that their child will be missing out on their childhood. Although caregiver-implemented interventions are considered an evidence-based practice, very little caregiver training is initiated and created alongside caregivers. Future caregiver training should leverage the knowledge of parents and the community to determine the modality of intervention and whether it is appropriate to the population intended. The need to bridge the gap between research and caregiver educational practice is critical to intervention development.
Background: Autistic girls, women and gender diverse* people experience physical and mental health challenges, are at increased risk of sexual violence, and have additional needs related to sexual and reproductive health. However, there is a lack of specific research that addresses these areas of need. In addition, the research agenda has predominantly been set by researchers rather than the autistic community. It is important to develop priorities with autistic girls, women and gender diverse people to provide research that it meaningful for their lives.

Objectives: This project aimed to develop an autistic-led research agenda for autistic girls, women and gender diverse people in Australia.

Methods: A group of autistic women and non-binary people led the project. Semi-structured interviews were conducted with 47 autistic people aged 7 and above. Reflexive thematic analysis was conducted to determine a draft research agenda. A follow up survey was then conducted in which we obtained feedback from 411 autistic girls, women and gender diverse people on our draft research agenda. Following this, consensus was reached, and the research priority areas were finalised.

Results: Research priorities were developed separately for young people and adults, to ensure that their differing needs and voices were recognised. Six research priorities were developed for autistic young people, covering a range of topics including school, the importance of understanding strengths and challenges, mental health support, friendships and relationships, experiences of gender diversity and providing accommodations to make life easier. Eight priority areas were identified for autistic adults, including understanding and supporting needs in adulthood, experiences of trauma, abuse and sexual violence, supporting mental health and wellbeing, physical health needs, addressing barriers in healthcare, education and employment, understanding the role of society, embracing neurodiversity and the importance of autistic identity, and the importance of co-designing research and supports with autistic people, including those with intersecting identities and from harder to reach groups.

Conclusions: This is the first project to develop research priorities that are led and informed by, and only includes autistic people. The research priorities identified will result in outcomes that are directly relevant for autistic girls, women and gender diverse people in Australia.

*This includes cis women and girls, transgender, non-binary, and gender diverse people, and anyone who was socialised, or identifies as a woman or girl.

**Poster** Developing an Autistic-Led Research Agenda for Autistic Women, Girls and Gender Diverse People in Australia

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**Poster** Differing Conditions for Research Participation of Adults and Children on the Autism Spectrum and Non-Autistic Participants

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Background: To date, research studies involving people with autism have hardly taken into account the specific needs and characteristics of those living with the diagnosis as study participants (e.g. sensory issues, social behavior). In order to realize a more autism-friendly and safe study environment, it is necessary to create ethically relevant standards for autism-specific research.

Objectives: A participatory autism research collaborative explores such standards for adult study participants on the autism spectrum. Since many scientific studies on autism primarily identify children as the target population, furthermore, a framework that supports adherence to ethically relevant and autism-specific standards for under-age study participants on the autism spectrum is explored.

Methods: For the study, relevant aspects from the literature (e.g., developmental psychological and sensory characteristics of children with autism), focus group work of the participatory research group, and expert interviews, 55 needs from the categories planning, process, sensory, communication, format (e.g. duration) and general conditions (e.g. payment) for participation in research studies were evaluated and integrated as approximately 47 items in an online questionnaire. These were rated for personal relevance in two nationwide surveys by 273 adult participants (autistic: N=185 (68%); age: M=39, SD=11; 67% female, non-autistic controls: 88 (32%); age: M=32, SD=9; 71% women) and 179 children (autistic: N=87 (49%); age: M=13, SD=3; 8% female, non-autistic controls: 92 (51%); age: M=12, SD=3; 53% women). Answers were rated according to mean scores and factor analysis was performed. Subsequently, linear discriminant analysis was used to identify those items that differentiate most strongly between the groups with and without an autism spectrum diagnosis.

Results: Group comparisons revealed statistically significant differences in the strength of importance ratings of adults and children with autism spectrum condition and respective controls: The choice of the type of contact, attention to sensory needs, announcement of touch, understanding of the benefits of the study, and later information about the study results were rated as more relevant by autistic adults than by the control group. In contrast, limitation of duration and compensation for expenses were rated as most important by the control group. For the group of autistic children adherence to previous study information given, avoidance of parallel tasks, and sensory needs among
others were rated more relevant than for non-autistic controls. The results of both surveys will be presented. Guidelines derived for researchers will be shared. Comparison between children’s and adults’ needs with autism will be discussed.

Conclusions: Results obtained in the study can illustrate possible special needs and preferences of autistic adults and children for study participation. Adaptation of study participation conditions for autistic participants of all ages, as a consequence, may reduce stress for autistic participants and increase internal validity of research studies as a result.

402.123 (Poster) Distraxaty: Disability, Stress, Sport and Relax. Meditation and Relaxation Techniques for Parents of Children with Neurodevelopmental Disorders, a Pilot Project.

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Background:

Parenting a child with a disability including neurodevelopmental disorders (NDDs) implies a high level of stress with an impact on the caregivers’ quality of life. Most of parental supportive interventions are focused on handling child difficulties. Meditation and relaxation training seems to be efficacious in the management of pervasive emotions, tension and stress within general population. Therefore, we developed the Distraxaty project, addressed to parents of children with a disability.

Objectives: To evaluate the efficacy of meditation and relaxation techniques in the reduction of Parental Stress within a group of parents of children with NDDs.

Methods: The Distraxaty project consists in sessions of meditation-relaxation techniques (1/week) addressed to all parents with a child affected by NDDs. 63 parents of children with NDDs including Autism Spectrum Disorder and Intellectual Disability, were considered for enrollment. 38 accepted to participate; 13 dropped out. 25 were enrolled as controls (did not practice meditative and relaxation techniques). At baseline and after 4 months of sessions, all participants underwent an evaluation of Parental Stress (Parental Stress Index), depressive symptoms (Beck Depression Inventory Scale-BDI) and sleep (minisleep questionnaire). Children of both groups were clinically characterized in terms of Intellectual Quotient (IQ), adaptive functioning (Adaptive Behavior Assessment System 2nd ed. ABAS-II), autism symptoms (Autism Diagnostic Observation Schedule 2nd Ed Calibrated Severity Score-ADOS-2 CSS), socio-relational skills (Social Responsiveness Scale-SRS), and behavioral problems (Child Behavior Checklist-CBCL).

Results: Final sample: meditation-relaxation Group (MRG) 25 parents (3 M; 22 F; mean age 47.6 yrs) vs Control Group (CTRL) 25 parents (3 M; 22 F; mean age 43.9 yrs) (Figure). Offspring of MRG parents were statistically significant older in comparison to children of control parents (11.2 vs 7.48; p = 0.0009). The two child-groups did not differ in terms of clinical features including IQ, adaptive functioning, ADOS-2 CSS, SRS total, CBCL total (Figure). Noteworthy, at T0, MRG parents were characterized by a major level of stress in most of the domains investigated (Total score p = 0.005, parental distress p = 0.006, parents-child interaction p = 0.0003) except for the subscale Difficult Child, whose score is influenced by the child disorder and clinical profile (homogeneous within this study). At T1, this difference among groups in level of parental stress did not persist. In the comparison T0-T1, no significant difference emerged within MRG group and within CTRL (PSI subscales, BDI, minisleep questionnaire).

Conclusions: Results obtained in the study can illustrate possible special needs and preferences of autistic adults and children for study participation. Adaptation of study participation conditions for autistic participants of all ages, as a consequence, may reduce stress for autistic participants and increase internal validity of research studies as a result.

402.124 (Poster) Employer Perspectives on Working with Individuals with Autism Spectrum Disorder

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Background: Employment is a socially normative activity critical to an individual’s autonomy and quality of life (Saleh & Bruyere, 2018; Walsh et al., 2014). Employers with previous experience feel that individuals with autism spectrum disorders (ASD) positively affect the workplace and are more likely to hire those with ASD (Author et al., 2022; Huang & Chen, 2015). Furthermore, workplace accommodations and inclusive practices implemented for all employees within a positive organizational culture result in better employee attitudes and support toward those with disabilities (Erickson et al., 2014; Schur et al., 2014). Thus, understanding employers’ perspectives...
and experiences are vital to creating positive organizational and cultural practices to ensure the employment success of individuals with ASD.

Objectives: Despite efforts to increase the employment of individuals with ASD, opportunities for competitive integrated employment have remained limited (Lysaght et al., 2012; 2017). Decreased revenue, adverse interactions between employees, and increased assistance for several employees are just a few of employers’ negative perceptions of individuals with ASD in the workplace (Scott et al., 2017). Therefore, when employers have these negative perceptions, it may deprive individuals with ASD of the opportunity to improve their financial stability, quality of life, and social opportunities through competitive integrated employment (Jahoda et al., 2009). This study aims to identify employers’ perceptions of individuals with ASD in competitive integrated employment. The following research questions are addressed: (1) What are employers’ perceptions and experiences with individuals with ASD in competitive integrated employment; and (2) What are the supports and needs employers require to work with individuals with ASD?

Methods: For this study, we are conducting a cross-sectional online survey (Creswell, 2012) of state-wide employers to collect their knowledge, experiences, and perceptions of working with individuals with ASD. We are using a 52-item survey on Qualtrics to assess challenges to hiring, advantages and disadvantages of employing individuals with ASD, and ease of implementing specific supports. The data will be analyzed using a range of statistical analyses, including descriptive analyses, \( t \)-tests, ANOVA, and multiple regression.

Results: Preliminary results show the sample \( (n = 36) \) is 55% female, 67% white, and 44% have earned their bachelor’s degree. Their ages range from 18-65 years old, with most companies employing 1-9 employees (75%). The participants’ knowledge of ASD is average (3.5; 1 = Very Poor, 5 = Excellent), and they are somewhat confident working with someone with ASD (3.9; 1 = not at all confident, 5 = very confident). While 94% \( (n = 34) \) of employers know someone with ASD (e.g., family member, friend, coworker), only 28% \( (n = 9) \) currently have an employee with ASD.

Conclusions: While these are only preliminary results, employers seem to have an average knowledge of ASD and are somewhat confident working with someone with ASD. The vast majority know someone with ASD, yet only a quarter employ an individual with ASD. Additional analysis with a larger sample will hopefully shed light on employers’ perspectives, experiences, and what employers need to hire additional individuals with ASD.

402.125 (Poster) Interns’, Employers’ and Parents’ Qualitative Experiences and Views of Employ Autism Network Internships.

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Background: Autistic people experience poor outcomes when progressing from education to employment, but supported employment initiatives have been shown to increase employment rates for autistic young people. Despite their success, little is known about the few employment initiatives that are designed to support this transition. A UK employment and Education charity, Ambitious about Autism, developed a unique supported and paid internship programme for autistic young people between the ages of 18 -25: the Employ Autism network. The Employ Autism network provides training and support for both the autistic interns and employers throughout the entire employment process, from applications to post-internship. In determining the success of such a programme, it is essential to examine the first-hand experiences and views of those involved the scheme. Specifically, autistic young people and their employers can offer valuable insight about the experience, and parents can offer insights about their important role in supporting their children’s transition into employment. Taken together, these insights can offer valuable, holistic information that advances evidence about best practice; both for this internship, and other similar schemes.

Objectives: The current study aimed to examine autistic young people’s (‘interns’), employers’ and parents’ experiences and views of a previously unevaluated paid internship scheme, the Employ Autism network.

Methods: This was a qualitative, multi-informant study, and data were collected using semi-structured interviews. A total of 51 participants across 8 internships participated: 19 interns, 22 employers, and ten parents. Each participant group’s interview schedules followed a similar structure and content, including questions about (1) previous experience of employment and autism, (2) experience/views of the internship, and (3) outlook after the internship. The interview transcripts were analysed following the phases of reflexive thematic analysis outlined by Braun and Clarke (2006, 2019), and the authors used a semantic, inductive approach to identify patterns and themes in the data through an iterative through discussion. The participant groups were analysed separately to reflect the different types of involvement in the Employ Autism network.

Results: Interns’ results yielded three themes: the Employ Autism network offered an opportunity to (1) break down barriers to provide “a foot in the door”; (2) a window for self-development; and they felt they experienced (3) effective and reciprocal communication during the Employ Autism internship. Employers’ results also yielded three themes: (1) partnerships were complimentary between employers and interns, however key to the success was (2) parking preconceptions and challenging stereotypes. Further, for this to be organisationally
relevant, the employers started to (3) rethink their current systems and practice. Parents corroborated the interns’ reports, and one further theme identified was that the Employ Autism network was perceived as (1) a path to independence for their young people.

Conclusions: These findings offer the first qualitative three-way informant data about one of the few supported employment schemes available to autistic young people. Such evaluations can be used to identify best practice for supported employment schemes, which has important implications for the development of further schemes.

**402.126 (Poster) Engaging Communities during Development of a Web-Based Tool for Communication about Environmental Health Research in Autism**

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**Background:** Both heritable (genetic) and non-heritable (environmental) factors contribute to the alterations in biological processes that lead to autism and its co-occurring conditions. One subset of non-heritable factors that have been increasingly studied are environmental chemicals, such as air pollution or pesticides. Communication about this rapidly growing body of research is important for a broad range of stakeholders. Scoping reviews and evidence maps are tools for researchers to summarize the current state of the peer-reviewed literature. However, these tools have limitations, including that they are static one-time assessments and are primarily written and developed for use by other researchers and may not be accessible to a wider audience. To address these challenges and provide a resource to communicate about the state of environmental health research in autism for both researchers and the broader autism community, the National Institute of Environmental Health Sciences (NIEHS) is developing a Web-based tool for Autism Research and the Environment (aWARE). For such a tool to be successful, it must incorporate features and functionality that make it useful for the multiple and complex intended audiences. To understand exactly what those features are, input from those audiences is needed.

**Objectives:** To engage with and collect feedback from an inclusive set of stakeholders that would inform the development of aWARE.

**Methods:** Four listening sessions and a meeting of the Environmental Epidemiology of Autism Research Network (EEARN) were held in the summer and autumn of 2022 to gather feedback and input regarding aWARE. Participants representing autistic individuals and families, advocacy and funding organizations, physicians and clinicians, and researchers were included in the listening sessions. During both the EEARN meeting and listening sessions, the aWARE project was briefly described before a longer guided discussion where participants were asked open-ended questions about how communities could use this tool and what features would make it more useful. Following these meetings, comments from participants were analyzed and themes identified.

**Results:** Participants in the series of listening sessions spoke to various themes that reflected their lived experiences and how they and their communities interact with scientific literature. Different stakeholder groups emphasized distinct features (e.g., accessibility, lay language) and metrics (details extracted from publications) that would make this tool most useful for their community. Participants provided information about various resources for web-tool and science communication development that can be incorporated in aWARE. A common theme across discussions was the scope of environmental health research, which indicates the need for clear definitions when describing the tool. Multiple sessions highlighted the opportunity that this tool presents to help educate a large range of stakeholders about environmental health research and reading scientific literature as a body rather than as individual papers. Integrating this feedback from the community as the development of the tool continues will be a major consideration.

**Conclusions:** Engagement with a broad range of stakeholders and communities has already provided valuable information and identified key opportunities for aWARE. Continuing this engagement throughout development and deployment of this web-based evidence map will be critical for its success.

**402.127 (Poster) Environmental Contributors to Autism Spectrum Disorder in Federal-Funded Research**

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**Background:** The National Institutes of Health (NIH) of the U.S. Department of Health and Human Services (DHHS) is the primary government agency whose mission is to conduct and support biomedical research in the interest of impacting public health. The NIH includes 27 institutes and centers, each responsible for defined, mission-relevant biomedical and scientific disciplines. The National Institute of Environmental Health Sciences (NIEHS) is an NIH institute focused on environmental exposures and human health. Environmental factors pertaining to the NIEHS mission are man-made or natural chemical substances, whereas others (e.g., nutrition or infection) are within the primary mission responsibility of other NIH institutes. All NIH institutes depend on portfolio analyses to better understand gaps and trends in funding and science, including in autism spectrum disorder (ASD) and environment research. This project uses a comprehensive definition of environment.
Objectives: NIEHS presents findings from a portfolio analysis of ASD and environment, comprising FYs 2008-2019, and its relationship to similarly supported research across NIH institutes and other federal agencies.

Methods: Federal grant data were collected, coded, and analyzed for trends in funding, environmental health factors, study types, impacts, and growth. Global networks and thematic components were extracted and visualized with software tools like Gephi and IN-SPiRE.

Results: Five federal agencies funded ASD-environment projects with the NIH funding the majority (87.8%). Most NIH projects were awarded by the National Institute of Mental Health (NIMH) (33.9%), NIEHS (32.1%), and the National Institute of Child Health and Disease (NICHD) (18.2%). The most researched environmental factors were maternal immune, psychosocial, pharmaceutical drugs, air pollutants, and nutrition. NIEHS supported nearly all research involving industrial chemicals and environmental pollutants. These frequently co-occurred with other in-mission and out-of-mission exposures (e.g., maternal infection), partly due to more cohort and observational studies. NIMH and NICHD primarily focused on single environmental factors with NIMH supporting more mechanistic projects with model systems. Temporal analysis of the NIEHS portfolio revealed a few metals (e.g., mercury), brominated (e.g., PBDEs) and chlorinated compounds (e.g., PCBs) before 2006. The portfolio evolved (through 2019) to include more variety of metal exposures, endocrine disrupters, and new categories like air pollutants. Immune-related genes appeared central in a co-occurrence network when we looked for biological and mechanistic themes. We visualized the genes in a bipartite network, finding associations with various environmental factors. Sixty-four percent were not in the SFARI database of autism susceptibility genes and probably considered for mechanistic or toxicological roles in exposure-related research. They may eventually merit future inclusion in the SFARI database of autism susceptibility genes.

Conclusions: Evaluating federal support of research in nongenetic factors and ASD provides a birds-eye view of the influential role government has on the state of the science and its evolution. This work provides context to help interested parties see gaps and opportunities for future research, including underlying biological associations with symptoms and co-occurring conditions. Innovation and new knowledge may accelerate their transition to interventions and services that help minimize the negative aspects of ASD-related symptoms and conditions for autistic individuals and their families.

402.128  (Poster) Evaluation of a Community-Academic Research Partnership with Racially and Ethnically Diverse Young Adults on the Autism Spectrum  
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Background: The autism community has expressed growing concerns about research not reflecting the priorities of autistic people. In response to these concerns, the Academic Autism Spectrum Partnership in Research and Education (AASPIRE) recently published practice-based guidelines for including autistic adults as co-researchers. Despite the presence of these guidelines, community-engaged research rarely includes autistic individuals from racially or ethnically marginalized groups.

Objectives: This study (1) evaluates our process of engaging racially and ethnically diverse autistic young adults in a community advisory board (CAB) according to AASPIRE guidelines and (2) describes the resulting improvements to the research process based on this partnership.

Methods: Our university-based research group studies the transition to adulthood among culturally-diverse autistic youth. Community-engaged research methods were used to ensure that culturally diverse autistic voices shaped our research process. Existing partnerships with community organizations were leveraged to recruit 6 autistic young adults (3 Black, 2 Latinx, 1 White; ages 18-24). Young adults attended virtual CAB meetings every 3-4 months. The AASPIRE guidelines were used to evaluate the resulting community-academic partnership and inform areas for improvement.

Results: Our process of engaging culturally diverse autistic young adults in the CAB was consistent with many aspects of the AASPIRE guidelines (Table 1). To ensure transparency about community partner roles, researchers discussed involvement details, communication preferences, and accommodation needs with each potential CAB member. We practiced effective communication and power-sharing by collaboratively developing group rules, providing flexible communication options, and sending materials in advance of the meetings. In order to build and maintain trust, researchers explicitly acknowledged their own privilege and biases, and young adults were encouraged to share their own lived experiences. Toward the aim of collaborative dissemination, young adults were invited to co-author conference presentations and manuscripts. Finally, grant funding was used to compensate CAB members for their work.

Reviewing our community-engaged research process according to AASPIRE guidelines also highlighted areas for improvement, such as increasing transparency in reporting how the researchers incorporated CAB feedback, offering CAB members opportunities to advance their own goals, and regularly engaging in visioning exercises to define shared goals.

This partnership led to important revisions to the research strategy and materials. For example, young adults gave us helpful feedback about the format for a transition-planning program, which was subsequently revised to better center the preferences of autistic youth. Their input
also informed hypothesized mechanisms of disparities to be studied quantitatively. Finally, CAB members were instrumental in revising questions about complex ideas, such as culture and identity, for qualitative interview guides.

Conclusions: Community-academic partnerships with culturally diverse autistic young adults have the potential to increase the relevance of research findings to the autism community. Given the history of mistrust between researchers and racially minoritized and disability communities, community-engaged research approaches may be especially important for those with multiple marginalized identities. Maintaining flexibility regarding communication preferences, facilitating open conversations about power and privilege, and ensuring that CAB member feedback is thoughtfully incorporated throughout the research process are key to successfully including diverse autistic voices in research partnerships.

402.129  (Poster) Evaluation of an Online Autism Experience Session: Improved Autism Knowledge and Reduced Stigma
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Background: Autistic individuals and their families report that they are often subject to stigma, which can have a negative impact on participation and wellbeing. Previous studies already indicated a link between autism knowledge and stigma. To reduce stigma and improve attitudes towards autistic individuals, combining information with personalized interactions has been proven to be effective.

Objectives: This study aims to evaluate the effect of an online autism experience session on autism knowledge and stigma.

Methods: An online autism experience session is an interactive meeting via Zoom for neurotypical individuals to experience the world from the perspective of autistic individuals. The online autism experience session is built around several activities regarding sensory sensitivities, communication and social interaction. The session is guided by two persons from the autism community (i.e., an autistic individual and/or a family member). In a pre- and post-test design, 48 participants (age: M = 44y, SD = 10.6; sex: men = 13%, women = 87%) filled out an online survey in the month before and in the week after the online experience session. The survey consisted of translated and adapted questionnaires on autism knowledge (Autism Awareness Survey; Gillespie-Lynch et al., 2017) and stigma towards autistic individuals (Social Distance Scale; Gillespie-Lynch et al., 2017). Our survey was developed in collaboration with the Flemish Association for Autism and a group of autistic adults involved in the organization of the online experience sessions.

Results: Although participants already had a relatively high level of autism knowledge before the session, their scores on the Autism Awareness Survey were significantly higher at post-test compared to pre-test (t = 2.41, p = .02). A significant decrease in stigma was found when we compared pre- and post-test scores on the Social Distance Scale (t = -3.13, p = .003). Autism knowledge was significantly negatively correlated with stigma at post-test (r = -.51, p < .001).

Conclusions: This study shows the potential of an one-off session with experience activities and testimonials of autistic individuals to improve autism knowledge and reduce stigma. However, additional research with a larger sample and a control group is needed to exclude alternative explanations.

402.130  (Poster) Examining Child Characteristics Associated with Parenting Daily Hassles in Parents of Individuals with Autism Spectrum Disorder and Other Developmental Disabilities
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Background:

Parenting daily hassles (PDH) are the day-to-day parenting tasks of caring for a child (Crnic & Low, 2002). Reports of PDH are often used as an indicator of parenting stress (PS). As the frequency and intensity of PDH accumulate consistently, parents are more likely to see their hassles as more distressing than what they can handle (Crnic & Low, 2002). Moreover, PS is associated with negative parenting and child outcomes (Crnic & Low, 2002). As stress is a multidimensional concept, examining different dimensions of PS is necessary. Parents of individuals with autism spectrum disorder (ASD) often report higher PS and DH compared to neurotypical children (Quintero & McIntyre, 2010). Given that research has suggested child characteristics are associated with PS in parents raising individuals with autism (Emily & Grace, 2015; Green & Carter, 2015), understanding child characteristics impact on PDH is a logical start. However, little research has focused on child characteristics associated with PDH in parents raising children with ASD.

Objectives:
In this study, we utilized a sample of children aged 3-5 diagnosed with either ASD or other developmental disabilities to understand child characteristics associated with PDH.

Methods:

Participants included 256 children (65.2% male, M age = 3.84 years (SD = .832), Hispanic/Latino = 66.4%). Close to half of the children had an autism diagnosis (N=121, 47.3%). PDH were measured through the Parenting Daily Hassles Scale (PDH; Crnic & Greenberg, 1990), and we used three subscales (See Table 1). Adaptive skills were measured through the Vineland Adaptive Behavior Scales – Third Edition – Interview Form (Vineland-3; Sparrow, Cicchetti, & Saulnier, 2016). IQ was measured through the Stanford-Binet Intelligence Scales – Fifth Edition (SB-5; Roid & Poplun, 2012).

Results:

Pearson’s correlations between child characteristics (Child age, gender, IQ, Vineland-3 subscale scores, and ASD diagnosis status) and PDH subscales were conducted (see Table 1). Variables that were significantly associated with PDH subscales were included in the final model. A series of hierarchical multiple regression analyses were used to determine the influence of significant child characteristics on the three PDH subscales. Together, child communication and externalizing behaviors accounted for 11.3% of the variance in total daily parenting hassles, F (2,140) = 8.94, p < .001, and were unique predictors of total daily parenting hassles. Together, communication, externalizing, IQ, and ASD diagnosis accounted for 14.4% of the variance in challenging parenting, F (4,116) = 4.90, p = .001. In the final model, communication (p = .014) and externalizing (p = .002) were significant predictors, but IQ and diagnosis were not. Predicting parenting tasks, together, communication, internalizing, externalizing, and IQ accounted for 11.3% of the variance, F (4,117) = 3.72, p = .007. In the final model, communication (p = .041) and externalizing (p = .011) were significant predictors but internalizing and IQ were not.

Conclusions:

These findings point towards two significant factors, child communication and externalizing behaviors, playing a role in PDH across the domains. The results are promising as communication and externalizing behavior problems are domains where we have highly effective interventions that may ameliorate PS.

Background: Positive caregiver responsiveness supports children’s age-appropriate development, especially in the domains of emotional self-regulation, compliance, social skills, and cognition (Ayar et al., 2021). However, for caregivers of children with social communication challenges such as autism, caregivers may struggle with responsiveness due to differences in how children respond to and interact with the environment (Stahmer et al., 2019). In addition, caregivers self-perception of their caregiving skills may be impacting caregiver behavior during caregiver-child interactions. In this study, caregivers self-report of caregiver self-efficacy and responsiveness during caregiver-child interactions were examined. These data may provide insight to improve support provided to caregivers within the context of early intervention settings.

Objectives: This project examines caregiver report of self-efficacy and direct observation of caregiver behavior to inform supports caregivers may benefit from in the context of early intervention services for young children with autism.

Methods: Data for this project were drawn from a community-based early intervention (EI) study involving 68 caregiver-child dyads receiving Part C EI services in California. Children averaged 25 months of age (SD = 5 months), were 75% Male (n = 51), and 57% Hispanic/Latinx (n = 39). Participating caregivers were 85% biological mothers (n = 58), and 54% identified as Hispanic/Latinx (n = 37). Caregiver behavior was assessed using the Parent Interactions with Children: Checklist of Observations Linked to Outcomes (PICCOLO; Roggman et al., 2013). Video-recordings of caregiver-child interactions were evaluated by trained coders across PICCOLO domains: Affection, Responsiveness, Encouragement, and Teaching. Caregiver self-efficacy was self reported using a 29-item measure called the Self-Efficacy for Parenting Tasks Index - Toddler Scale (SEPTI-TS), with domains: Nurturance, Discipline, Play, and Routine (van Rijen et al., 2014). Subscales of each measure were explored to examine potential relationships among constructs and reporting methods.

Results: On average, caregivers scored within the normal ranges for all domains of the SEPTI-TS: Nurturance (M = 38.12, SD = 2.95), Discipline (M = 25.00, SD = 4.99), Play (M = 35.19, SD = 5.14), and Routine (M = 29.08, SD = 8.88). Comparisons among subscale means revealed the Discipline score was significantly lower than the three other subscales (ps < .05). During direct observation, caregivers
displayed high levels of Affection ($M = 12.30$, $SD = 1.90$), Responsiveness ($M = 11.74$, $SD = 2.13$), and Encouragement ($M = 11.11$, $SD = 2.39$) on the PICCOLO, and scored significantly lower in the Teaching domain ($M = 9.66$, $SD = 3.13$, $p < .05$). There were no significant correlations among the subscales of the PICCOLO and SEPTI-TF measures ($ps > .05$).

Conclusions: Caregivers of young children with autism receiving early intervention services report adequate feelings of self-efficacy and are successfully responsive during interactions with their children. Self-reported caregiver feelings of parental self-efficacy were not related to observed interactions with their children during play. Lower scores in the Discipline and Teaching PICCOLO domains highlights these two areas as targets for possible support to caregivers within the context of early intervention services. Strategies to address this gap will be discussed.

**402.132** (Poster) Examining the Identities of Autistic Students through an Intersectionality-Informed Lens: A Pilot Study

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**Background:**

Autistic people who are diverse in multiple ways, such as people with co-occurring disabilities and/or racial, ethnic, sexual, and/or gender minorities, may face unique barriers to full societal inclusion (Jones et al., 2020; Mallipeddi & VanDaalen, 2021; Peña, 2019. Therefore, the often limited degree to which autistic people with additional marginalized identities are represented in existing research is a major concern. Some studies have examined intersecting identities with autism. For example, by exploring associations between being autistic and LGBTQIA+ (Van der Miesen et al., 2018; Nabbijohn et al, 2019; Stang et al., 2018; Bush et al., 2021; George & Stokes, 2018). However, little remains known about how these identities may impact autistic individuals. Both LGBTQIA+ and autistic individuals face discrimination. This discrimination, in the form of minority stress (Meyer, 2003), may lead to worse mental health outcomes among LGBTQIA+ (Kelleher, 2009) and autistic (Botha & Frost, 2018) individuals. However, being part of either group can be rewarding and, for autistic individuals, being connected to the autistic community may help protect them from minority stress (Botha et al., 2021).

**Objectives:**

To explore the breadth of identities autistic individuals may identify with, which identities are central to how they see themselves, which are central to how they feel others see them, which are sources of discrimination, and which are sources of strength.

**Methods:**

Autistic college students ($n=18$; $M$Age$=25$; 75% male, 22% female, 17% nonbinary; 61% White) recruited from a participatory mentorship program completed a survey that included the following questions: Which identities are part of who you are?, Which of your identities that have the strongest effect on how you see yourself?, Which of your identities have the strongest effect on how others see you?, Which of your identities give you strength?, and Which of your identities have you experienced discrimination against?. For each question, participants could select from the options presented in Table 1. Participants could select as many options as they chose and could provide additional information within a text box below each option.

**Results:**

Most commonly, participants reported disability (56%), talents (44%), gender identity (44%), and sexuality (33%) as having the strongest effect on how they see themselves. Similarly, participants reported their talents (50%), disability (39%), gender (39%), and sexuality (33%) as having the strongest effect on how they are perceived by others. However, others’ perceptions of their physical attributes were also reported by 33% of participants as having a strong impact on how they are perceived by others. Disability was the most common reason for experiencing discrimination (44%), followed by sexuality (28%), race (22%), and gender (22%). However, disability was also the most commonly-reported source of strength (56%) along with talents (56%).

**Conclusions:**

While autistic people experience discrimination due to their disability, identifying with one’s disability can also provide a source of strength for the individual. People often drew strength from their talents, which can also be an important aspect of their identities, along with disability, gender identity, and sexuality.

**402.133** (Poster) What Is the Psychological, Behavioral and Physical Burden of Giving Care to Someone with Autism?

Background: People who give care to someone with an autism spectrum disorder (ASD-caregivers) experience on average more caregiver distress than people who take care for someone with other chronic conditions (non-ASD-caregivers) (Hayes and Watson, 2013). Also, caregiver distress is associated with physical health problems and increased mortality risk (Fairthorne et al., 2014; Hartley et al., 2021). Therefore, the health of ASD-caregivers should be of great concern. Nonetheless, significant psychological, behavioral, and physical aspects of distress in ASD-caregivers are still unknown. To improve ASD-caregivers’ health and reduce their morbidity and mortality risk, more insight into their caregiver burden is needed (Dijkstra-de Neijs et al., 2020).

Objectives: The aim of this study is to investigate the presence of psychological, behavioral, and physical burden in ASD-caregivers compared to non-ASD-caregivers.

Methods: We included 3354 adult caregivers from the Lifelines Cohort Study, who filled in a questionnaire about informal caregiving. With multivariable logistic regression models, correcting for lifetime, sex, and socioeconomic status (employment and educational attainment), we analyzed psychological, behavioral, and physical factors in ASD-caregivers (n=722; mean age 51 years old, 75% women) compared to non-ASD-caregivers (n=2632; mean age 54 years old, 68% women). The included psychological factors were defined as chronic stress (assessed with the Long-term Difficulties Inventory), quality of life (health-related QoL, based on RAND-36), and an anxiety and/or depressive disorder (based on a Mini International Neuropsychiatric Interview). Behavioral factors included physical activity (assessed with the Short Questionnaire to Assess Health-enhancing physical activity), alcohol use (based on the Flower Food Frequency questionnaire), and smoking (currently or in the past month). Investigated physical factors were body mass index, waist circumference (both measured during a physical visit), and leukocyte- and subtype-counts (drawn from blood samples).

Results: Multivariable regression models adjusted for confounders (Table 1) showed that ASD-caregivers reported more chronic stress (odds ratio (OR) 1.17, 95% confidence interval (CI) 1.13-1.22) and lower health-related QoL (OR 0.82, 95% CI 0.73-0.92) compared to non-ASD-caregivers. Moreover, the presence of an anxiety and/or depressive disorder was more common in ASD-caregivers than in non-ASD-caregivers (13.9% versus 7.8%; OR 1.83, 95% CI 1.38-2.44). With respect to the investigated behavioral factors, physical activity, alcohol use of more than two glasses per day, and smoking were not statistically significantly different between ASD-caregivers and non-ASD-caregivers. Regarding the included physical factors, lower lymphocyte-counts (OR 0.77, 95% CI 0.66-0.91) and monocyte-counts (OR 0.47, 95% CI 0.24-0.92) were found in ASD-caregivers than in non-ASD-caregivers. Furthermore, the neutrophil-to-lymphocyte ratio was higher in ASD-caregivers than in non-ASD-caregivers (OR 1.15, 95% CI 1.02-1.28). The other physical factors were not statistically significantly different between ASD-caregivers and non-ASD-caregivers.

Conclusions: In adults who are caregiver for someone with an autism spectrum disorder, the psychological burden is higher than in adults who are caregiver for someone with other chronic conditions. In addition, ASD-caregiving is related to an immune system disbalance. To improve ASD-caregivers’ health and well-being, more focus should be on reduction of psychological caregiver-burden.

Poster Experiences of Parents Who Have a Child with High Likelihood of Neurodevelopmental Conditions: A Systematic Review and Meta-Synthesis

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Background: Being pregnant with the knowledge that the child has an increased likelihood of developing a neurodevelopmental condition such as autism and ADHD can significantly impact on a parent’s experiences and perceptions of the child. Although a wide range of maternal conditions increase this likelihood, studies have tended not to consider commonalities (and divergences) in the parental experience of pregnancy across a range of groups.

Objectives: This meta-synthesis reviews the lived experiences of participants as expectant parents or a child under two years of age, and who has a high likelihood of developing a neurodevelopmental condition in the first 1001 days of life. High likelihood was defined in the most frequent conditions known to be associated with neurodevelopmental conditions, such as (a) substance use, (b) familial susceptibility and (c) advanced maternal age.

Methods: After screening 4015 English-language peer-reviewed qualitative (in part or full) studies retrieved from 4 databases, 23 studies were reviewed using a thematic synthesis approach (κ = 1 in abstract and title check, κ = 0.60 in full text check). CASP quality appraisal tool was also applied to the studies.
Results: Of the 23 studies reviewed, a broad range of samples (participants included 489 women and 18 men) were identified, with 14 studies of mothers with substance use, five studies on older mothers (over 35 years), one study of mothers with HIV exposure and one study of mothers with bipolar disorder. Only two number of studies focused on increased likelihood as defined by having an older child with autism. Three themes were identified around parental perceptions across these diverse groups: (a) Women’s readiness to have a baby was paired with anxiety around the uncertainty of the condition presenting, (b) Feelings of guilt impact on the mother’s role, and (c) Paternal anxiety and hopelessness are balanced with trying to enhance the infant’s environment. In autism-related research, readiness is specified as feeling ready to have a second child who has the same condition, yet in other studies, readiness is regarded as being prepared for pregnancy by parents. There were no studies of autistic parental perceptions and experiences. In terms of coping mechanisms, parents who have older autistic children monitored their younger child's development, whilst other parents concentrated on mothers’ health and lifestyle changes such as diet and sport.

Conclusions: The findings of this systematic review suggest similarities in concerns and experiences that healthcare professionals need to be aware of to help support parents, irrespective of the nature of the neurodevelopmental condition and its likelihood. There is a lack of research on early parental experiences of families who have a child or pregnant with high likelihood of autism, designing further qualitative studies is needed to enrich the existing knowledge.

402.135 (Poster) Experiences of Serbian Parents of Individuals with Autism

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Background: As Serbia went through wars and economic instability for the last three decades it is particularly important to learn about experiences (e.g., positive parenting experiences, experiences with governmental institutions, support, etc.) of parents of individuals with autism in these circumstances. Although there are people with autism in Serbia there has not been any nationwide survey on its prevalence and thus it is an even greater challenge to support them. Many studies explored experiences of parents of individuals with autism worldwide, but there is limited information about experiences of Serbian parents of individuals with autism.

Objectives: The aim of the present study is to explore Serbian parents’ perspectives on (a) positive aspects of parenting children with autism and personal changes that occur through parenting, (b) sources of support, (c) potential changes in how the general public regards families of individuals with autism, and (d) experiences with the public sector.

Methods: This study is a part of a large project that included a convenience sample of 40 parents of individuals with autism. The parents were recruited through parental support organizations and public schools from the several cities across the country. Parents responded in a written format to five open-ended questions that explored (a) positive parenting experiences, (b) personal changes, (c) sources of support, (d) whether something needs to be changed in public (i.e., people’s opinions and public sector) regarding families of individuals with autism, and (e) experiences with the public sectors (e.g., state hospitals, public education, etc.). The parents’ ages ranged from 34 to 71 years, while the age of their children ranged from 4.5 to 41 years (M = 15.1, SD = 8.84). A total of 87.5% of the sample consisted of mothers. Data were analyzed using content analysis method.

Results: In total, six themes emerged: (a) positive experiences of parenting, (b) personal changes, (c) sources of support, (d) negative experiences with the public sector, (e) positive experiences with the public sector, and (f) necessary changes in public attitudes towards families of individuals with autism. Parents shared that the positive experiences were reflected through a feeling of sincere love, positive personal changes, and enjoyment in witnessing the child’s development. The most commonly reported negative personal changes were poorer health, depression, and loss of self-confidence. Spouse and close family members were the the most common source of support. Almost all parents agreed that general public’s attitudes towards families of individuals with autism need to be improved. Finally, negative experiences with the public sector were commonly reflected through the negative attitudes of employees and the lack of systematic support, while positive experiences were with some professionals.

Conclusions: The present study explored experiences of the Serbian parents of individuals with autism. Overall, parents shared a lot of positive examples of parenting experiences, although some groups of parents shared examples of negative personal changes. Parents agreed that changes in public and in the public sector are needed as stigma is still present, which is in line with other research.

402.136 (Poster) Interventions to Improve Mental Health and Well-Being in Parents of Adolescents with ASD and Other Neurodevelopmental Conditions: A Systematic Review of the Literature

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Background: Parents of autistic children report higher levels of stress and mental health difficulties compared to parents of typically developing children (Padden & James, 2017) and parents of children with other developmental conditions, such as Down syndrome and cerebral palsy (Hayes & Watson, 2013). Adolescence often represents an additional level of pressure for parents as it is a period of significant change for autistic young people as well as for parents. There is therefore a need for parent mental health support programmes that are cost-effective and specifically tailored to the needs of parents during their child’s adolescence.
**Objectives:** To identify interventions focused on improving parental mental health and well-being of parents of adolescents with a diagnosis of ASD and/or other Neurodevelopmental Conditions (NDC) and synthesize details about their effectiveness.

**Methods:** The systematic review was informed by the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines and included: a) peer-reviewed studies published in English, b) parents of children between 10 and 19 years old diagnosed with ASD and/or other NDC, c) use standardised assessment measures to report mental health/well-being outcomes and d) include control groups or pre-post comparisons. Studies were retrieved from nine databases. Data extraction comprised papers’, studies’, participants’, and interventions’ characteristics, and significant results were further reported, analysed and discussed.

**Results:** A total of 27 papers containing 28 interventions and 1,752 participants were reviewed. Most of the papers (n = 19, 70.37%) were described as non-randomised studies and twelve studies (44.44%) did not comprise a control group as they made a pre-post comparison analysis within the experimental group only. Sixteen interventions had follow-up analyses conducted with a mean duration of eighteen weeks (SD = 37.55). Most participants were described as females (86.05%) and mothers. Participants’ mean age was 44.9 years old (SD = 3.26) and 13.03 years old (SD = 2.35) for their children. Most papers had a total or part of the sample of parents of adolescents with ASD (n = 22, 81.48%), and parents of adolescents with ASD only comprised a total of 601 participants (34.30%). Regarding the interventions, nineteen different programmes were identified and categorised into three groups: mindfulness-based (n = 12), psychoeducational (n = 5), and therapeutic approaches-based (n = 2). The most frequently measured outcomes in the studies were stress (n = 22), depression (n = 16), anxiety (n = 12), and mindfulness (n = 11). For mindfulness-based interventions, eleven studies reported improvements in stress, five in depression, five in anxiety, and eleven in mindfulness. Psychoeducational interventions had one study reporting improvements in stress, another one in anxiety, and three in depression. Finally, therapy-based interventions had one study reporting improvement in depression and another study in depression.

**Conclusions:** In summary, retrieved interventions showed promising results for improving parental mental health, but more investigation is needed to confirm their effectiveness, as most studies were framed as preliminary/pilot/proof-of-concept. Furthermore, studies did not report community involvement in the development of the reported interventions, which indicates a gap that needs to be addressed in further research.

**402.137 (Poster) Exploring Views on Future Directions of Research Involving Nonbinary Autistic People through Lived Experience**

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**Background:**

The research process usually starts with a problem, issue or idea. Autistic and disabled activists that they should be the leading authorities on issues that affect them - ‘Nothing about us, without us’ (Charlton, 1998). Participatory autism research should, therefore, involve stakeholders in decisions on research agendas and directions (Pellicano et al., 2014). Autistic people are 5 to 7 times more likely to be transgender or nonbinary (Warrier et al., 2020). An INSAR special interest group convened at the annual meeting in 2018 highlighted the need for further research into LGBTQ populations (Dewinter et al., 2020). However, to date no research has looked at what genderdiverse autistic people think about research that involves them or what future research should focus on.

**Objectives:**

This project sought to capture what nonbinary autistic people think about research that involves them and how this relates to their experiences. This included looking at their views on current research, what future research should focus on and how these views are informed by their experiences. A phenomenological lens was chosen to provide novel insights into how views on research draw on individuals’ experiences in their own lives.

**Methods:**

Nonbinary autistic participants were contacted directly on social media with a focus on selecting five individuals from a range of backgrounds. The project utilised interviews alongside creative and participatory methods where participants were asked to come up with their own research questions by drawing on themes from their own lives. Interview data was analysed using interpretative phenomenological analysis (Smith et al., 2022), which allowed connections to be made between individuals’ views and experiences.

**Results:**

Participants valued current research that included participants and experiences from a diverse range of backgrounds. They also prioritised current research that was relevant to the immediate needs of the community. Participants thought future research should be community-led and had ideas about the role of education in facilitating social change and meeting the needs of nonbinary autistic people. Participants’
views were informed by foundational experiences growing up, conflict throughout their lives and newfound self-discovery and empowerment in their present day as well as interactions with others in their communities.

Conclusions:

Exploring the views and experiences of gender diverse autistic people sheds light on insights that can be gained by considering those with multiple marginalised identities. Findings have implications for future research. These include considering how research can reflect the diversity of experiences and identities within the autistic community and how participatory methods can be employed across a broader range of areas of autism research, a message which has been echoed by both autism researchers and advocates (Pellicano, 2020).

402.138 (Poster) Exploring the Experiences of Families with Autistic Daughters in Seeking and Utilising Support: A Scottish Perspective. C. Ballantyne and M. Condie, (1)Department of Psychology, University of the West of Scotland, Paisley, United Kingdom, (2)University of the West of Scotland, Paisley, United Kingdom

Background:

In 2010, The Scottish Government invested £10M to support The Scottish Strategy for Autism, which highlights the need to consider autism in the early years, primary and secondary school stages (Scottish Government 2010) and should theoretically lead to increased awareness of all autistic children within education settings. Indeed, accessing and locating appropriate services of support is an essential aspect in improving quality of life, both for an autistic young girl and her family. Past research shows that autistic females are more likely to go unnoticed or diagnosed at a later age compared to their male counterparts, subsequently impacting the degree of support they receive from healthcare/social services, education, and local resources etc.

Objectives:

The study intended to bring attention to the discrepancies in the female presentation of autism and the possible impact this had on the quantity and quality of support provided to families for their daughter/s.

Methods:

Twelve mothers of autistic young girls across Scotland completed online semi-structured interviews. The mean age of the young girls the parents represented was 9.53 years, with ages ranging between 3 and 16 years old. Of the sample, 11 of the children had received a formal clinical diagnosis of autism, 3 children were currently awaiting an assessment for autism, and 1 child was suspected to be presenting with symptoms of autism. Additional information revealed that of the sample, 14 children attended a mainstream school while only 1 child attended an alternative provision. The discussions centred around their experiences of seeking and utilising the supports available to them.

Results:

Using Braun and Clarke’s (2006) thematic analysis, four key themes emerged: Experiences with education and school support (the consequences of masking; school interventions), Perceived barriers when accessing support (post code lottery; dependency on obtaining a diagnosis to access support; harmful professional stereotypes of autism), Involvement of parents (parent-led research efforts; fighting for access to support) and Scarce provision for post-diagnostic support.

Conclusions:

Findings indicated that a majority of parents experienced various difficulties with the accessibility of support service provisions, including their knowledge of existing autism-specific supports and experiences of stigmas leading to inadequate help or a reluctance to implement such. Findings can be utilised to inform other caregivers, educational and healthcare professionals about the presentation of autism in young girls. Future research should focus on exploring the influence of sex/gender disparities within autism from the perspectives of professionals, in order to prevent the frequent under-recognition and misdiagnosis of autistic females. This could ensure that the current support service provisions in Scotland and beyond are specifically designed to address the needs of autistic girls.

402.139 (Poster) Exploring the Measurement of Parental Perspectives of Implementation Effectiveness in Early Interventions for Autism: Findings of a Systematic Review. M. Frisch, M. Barton and D. A. Berger, Psychological Sciences, University of Connecticut, Storrs, CT

Background: The evaluation of implementation outcomes is critical to understanding treatment effectiveness and stakeholder groups provide important perspectives to this evaluation (Proctor et al., 2011). In autism early intervention, parents are a key stakeholder group. Parents determine what interventions their child engages in and serve as interventionists outside of direct provider hours (Burrell &
Borrego, 2012). Given the significant role of parents in autism early intervention, it is important to explore the perspectives of parents with regard to early intervention implementation outcomes and these perspectives should be evaluated as a component of intervention efficacy. Yet, there is limited literature which explores how parent perspectives of implementation effectiveness influence the determination of intervention effectiveness.

Objectives: This study aims to review how autism-specific early intervention studies measure parent perspectives of implementation outcomes and how those outcomes are integrated into determination of treatment efficacy.

Methods: A systematic review of autism-focused early interventions was conducted in accordance with PRISMA guidelines for systematic reviews (Page et al., 2021) and the protocol was pre-registered on the Open Science Framework (OSF; Record ID: osf.io/suaxk). Randomized studies that reported both child outcomes and parent perspectives of implementation effectiveness were included. Proctor et al.,’s (2011) taxonomy of implementation outcomes was used to determine whether a study measured parent perspectives of implementation effectiveness. Intervention outcomes assessed included acceptability, adoption, appropriateness, feasibility, fidelity, and cost.

Results: A total of 22 unique manuscripts met inclusion criteria; two manuscripts (Carr et al., 2016; Kasari et al., 2014) were identified to be the same study population but reported on different implementation outcomes and were thus grouped together, resulting in 21 studies reviewed. Intervention acceptability (14 studies) and fidelity (15 studies) were the most frequently assessed variables. No studies measured intervention appropriateness. Nine studies measured adoption, two studies measured feasibility, and one measured cost. Outcomes were assessed through a variety of measurement strategies; Likert scale questions were most commonly used across outcomes. The reviewed studies minimally integrated implementation outcomes into their conclusions regarding implementation effectiveness. Two studies measuring adoption did not report outcomes (Dawson et al., 2010; Schertz et al., 2013). Out of the 21 studies reviewed, Byford et al., (2015) was the only study to clearly utilize the measured implementation outcome, cost, to inform determination of intervention efficacy.

Conclusions: Overall, findings indicate considerable variability in implementation outcome measurement and these outcomes were not utilized to inform conclusions regarding intervention efficacy. These findings highlight a gap in autism early intervention research and a need for greater consistency of method when assessing implementation outcomes. Such efforts will allow for the uniform integration of parent perspectives into practice and greater comparability between studies. Increased consistency of implementation outcome measurement across studies would allow for greater understanding of parental perspectives of early interventions for young children with autism. Such understanding will allow researchers and clinicians to best evaluate interventions for both intervention and implementation efficacy and integrate findings to inform future treatment efforts.

402.140 (Poster) Exploring the Mental Healthcare Experiences of Autistic LGBTQ+ Young Adults: A Community-Partnered Study

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Background: Autistic individuals are more likely than their non-autistic counterparts to identify as LGBTQ+ (Dewinter et al., 2017). LGBTQ+ autistic adults experience substantial disparities in access to healthcare compared to their non-LGBTQ+ autistic peers (Hall et al., 2020). Although rates of co-occurring psychiatric diagnoses are high amongst this population, very little is known about the mental healthcare experiences of autistic LGBTQ+ individuals. This is the first study to our knowledge that utilizes a community-partnered participatory approach to understand barriers and facilitators to accessing mental health care for autistic LGBTQ+ young adults.

Objectives: Explore the experiences of LGBTQ+ autistic young adults (18-28 years old) with regards to their mental health status and mental healthcare.

Methods: This study utilized a qualitative, phenomenological approach to examine the experiences of LGBTQ+ autistics in mental healthcare. We employed community-partnered participatory methods (Jones et al., 2009) to create an advisory group of 5 autistic LGBTQ+ adults. Participants were recruited through local organizations and social media. Semi-structured interviews took place via video call, phone, or synchronous text-based chat and were transcribed. We coded and analyzed interview transcripts using Braun and Clarke’s 6-phase approach to thematic analysis (Braun & Clarke, 2006). Three authors read the first 4 interview transcripts and identified key themes to create an initial coding dictionary. Thematic consensus was reached by the fifth coding meeting. The presenting author and a student researcher coded remaining interviews and met regularly to ensure consistency and reach consensus.

Results: 29 participants (18-28 years old, M_age= 23.3 years) completed a survey and signed up to participate. Almost half (48%) of survey participants identified as non-binary, gender fluid, or gender non-conforming and all participants reported at least 1 co-occurring mental health and/or disability diagnosis (e.g., ADHD, depression). Sixteen of the 29 participants opted into a semi-structured interview about their mental healthcare experiences. Interviews ranged in duration from 45 minutes to 2.5 hours. Six preliminary themes emerged from the data, including: 1) People don’t believe me about who I am: disbelief & misconceptions about LGBTQ+ and autistic identities, 2) Mental healthcare can also be individual practices & community care, 3) Being in community with other autistic people matters for my mental healthcare, 4) Being in community with other autistic people can lead to better care, 5) Mental healthcare should be accessible, and 6) Mental healthcare professionals should be trained in autistic cultural humility.

Conclusions: Overall, findings indicate considerable variability in implementation outcome measurement and these outcomes were not utilized to inform conclusions regarding intervention efficacy. These findings highlight a gap in autism early intervention research and a need for greater consistency of method when assessing implementation outcomes. Such efforts will allow for the uniform integration of parent perspectives into practice and greater comparability between studies. Increased consistency of implementation outcome measurement across studies would allow for greater understanding of parental perspectives of early interventions for young children with autism. Such understanding will allow researchers and clinicians to best evaluate interventions for both intervention and implementation efficacy and integrate findings to inform future treatment efforts.
Conclusions: Autistic LGBTQ+ young adults reported both positive and negative experiences in accessing mental healthcare. Participants shared concrete ideas for how mental health supports can be more autistic and LGBTQ+-affirming. Several themes highlight unique stressors that autistic LGBTQ+ young adults face living at the intersection of multiple-marginalized identities. Participants described community care, knowledge-sharing and connecting to other autistic queer people as buffers to mental health challenges. These findings can help guide clinicians in supporting their autistic and LGBTQ+ patients, and can help autistic LGBTQ+ adults find mental health support that feels right to them.

402.141 (Poster) Factor Analysis and Exploration of Parental Resilience and Parental Stress in Black Caregivers of Youth with ASD

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Background: There is a substantial body of work documenting high rates of stress among caregivers of youth with ASD, but focused research examining parenting stress across racial groups is mixed. Past studies have found greater levels of parenting stress among Black caregivers of youth with ASD compared to other groups. Disproportionate service disparities and treatment barriers may be implicated in increased stress among Black caregivers. However, emerging research has also found family resilience to protect against parenting stress in Black families. Indeed, research in the general population has postulated that adaptive, cultural coping in Black families may buffer against racial stressors (e.g., racism, microaggressions), but few studies have explored resilience among Black families of autistic youth. The present study investigated parental stress and resilience, and subsequent links to treatment barriers and family factors, among Black families of youth with ASD.

Objectives: To characterize parental stress and parental resilience in a sample of Black caregivers of youth with ASD; and to examine the relationship among parental stress, parental resilience, treatment satisfaction, racial barriers to treatment, household income, and caregiver age.

Methods: Caregivers (N = 101) of youth with ASD, ages 0 – 21, completed a demographic questionnaire, the Parental Stress Scale (PSS), and the Barriers to Treatment Participation Scale. Participating caregivers also completed a questionnaire developed by the research team which assessed racial barriers to treatment (e.g., experience of microaggressions).

Results: A maximum likelihood confirmatory factor analysis was performed; items from the PSS loaded onto two latent factors comprising parental stress and parental resilience. The parental resilience factor was specified to reflect current literature operationalizing parental resilience, in part, as positive perceptions of parenting. As chi square is often significant with complex models, fit was determined using the Comparative Fit Index (CFI > .90) and the Standardized Root Mean Square Error of Approximation (SRMR < .08). Fit indices suggested the model was an acceptable fit to the data, CFI = .91, SRMR = .07. Parental resilience and parental stress significantly and negatively covaried, and they were retained as factors for linear regression analyses. There were significant associations between parental resilience and both satisfaction with treatment services (F(1, 98) = 4.69, p = .03, R² = .05) and perceived racial barriers to treatment (F(1, 98) = 5.48, p = .02, R² = 0.05). Further, household income and caregiver age were both predictive of parental resilience F(2, 96) = 7.15, p = .001, R² = .13. However, when controlling for both, only household income was significantly associated with parental stress (F(2, 93) = 9.50, p = .01, R² = .09).

Conclusions: Findings support the strong association between increased parental resilience and decreased parental stress among Black caregivers of youth with ASD. It is possible that socio-demographic features (e.g., younger parent, financial strain) and barriers to care (e.g., perceived racial barriers, dissatisfaction with treatment) may interact and result in increased parental stress and depleted resilience. Future efforts should emphasize policy-, community-, and family-oriented research to decrease barriers to care and promote parental resilience.

402.142 (Poster) Factors Affecting Quality of Life in Adolescent Siblings of Children with Autism Spectrum Disorder

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Background:

Siblings of children with autism (autism spectrum disorder, ASD) are reported to have poor quality of life (QoL), but not much Indian data is available regarding this aspect.

Objectives:
To compare the QoL of adolescent siblings of children with ASD, with siblings of typically developing children, and study the factors affecting the QoL.

Methods: Between 1st February, 2021 and 31st September, 2021 (expect periods of intermittent COVID-19 related discontinuation of non-COVID services), 40 children aged 10–18 y, whose child sibling was suffering from autism spectrum disorder, were enrolled (Study group). Forty age- and sex-matched siblings of children with no clinically apparent neuro developmental abnormality or behavioral problem were also enrolled (Control group). Those with obvious chronic medical/surgical disease affecting QoL, or clinically apparent speech or hearing problems were excluded. Severity of autism was assessed by using the Childhood Autism Rating Scale 2 (CARS-2) score. QoL was assessed by a validated version of the WHOQOL-BREF in Hindi language, which has four subsections viz., physical factors, psychological factors, social factors and environmental factors. QoL was compared between cases and controls using Wilcoxon rank sum test.

Results:

The mean (SD) age of the study participants was 13.55 (2.75) years. More than a third of children with ASD (14, 35%) had comorbid global developmental delay. None of the patients had any other diagnosed co-morbidity like epilepsy or Attention Deficit Hyperkinetic Disorder. The mean (SD) CARS-2 score of our sample was 35.78 (5.23). Mild to moderate autism was seen in 23 (57.5%) children and 13 (32.5%) had severe autism. The QoL in ASD-Sibs was worse than TD-Sibs in all four domains ($P < 0.001$). QoL was compared between ASD-Sibs with respect to severity of autism in their siblings. A statistically significant difference was found between the two groups only in social domain ($P = 0.04$). QoL was compared between ASD-Sibs with and without GDD. There were no differences in QoL in the two groups in any domain. No statistically significant difference in the QoL with respect to age, sex, type of family, nutritional status but a statistically significant difference in QoL in physical domain ($P = 0.01$) was obtained while comparing the socio-economic status.

Conclusions:

The observed poor QoL in adolescent siblings of children with ASD, with it being worse in those whose siblings had more severe ASD, suggests the need for targeting the family as a unit while formulating plans for the holistic management of children with ASD. Unaffected siblings may, in addition, require targeted counseling and other interventions.

402.143 (Poster) Factors That Predict Families’ Engagement in Publicly-Funded Early Intervention Services

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Background: Engagement in early intervention (EI) services improves outcomes for autistic children. Families from marginalized and minoritized backgrounds receive and engage in these services at disproportionately low rates (Bilaver et al., 2020). Previous research has shown that families from low-income households are more likely to disengage from services (Pellecchia et al., 2018). Additionally, mothers of autistic children report more psychological distress (Karp et al., 2018). These factors can have negative effects on treatment engagement, but little is known about their association with service retention in community-based EI. A deeper understanding of factors influencing service retention for families from historically minoritized and marginalized backgrounds can lead to the development of strategies to better support their service engagement.

Objectives: To evaluate demographic (education, income, and quality of life) and service level (treatment dosage) factors that are associated with family engagement in publicly-funded, community based EI services, in order to inform strategies to improve service engagement for marginalized families.

Methods: Through a community-based randomized pilot trial, children under 30 months of age who received publicly-funded EI services (N=60) and their caregivers were randomized to three conditions: 1) 4 hours/week of Project ImPACT, 2) 1 hour/week of Project ImPACT, or 3) 1 hour/week usual care. Intervention was provided by community-based service providers for six months. We used the number of hours of service delivered in each arm as a measure of treatment dose. Families completed a demographic questionnaire and the World Health Organization Quality of Life-Brief (WHOQOL-BREF) upon enrollment. Family session attendance, our measure of treatment engagement, was monitored weekly throughout the study period. Dropout rates were calculated for each demographic and service use factor. Adjusted odds ratios were calculated using a logistic regression model that included these factors as independent variables to predict dropout during the study period.

Results: Families randomized to 4 hours per week of Project ImPACT were more likely to continue EI services than families in either the 1 hour per week of Project ImPACT or treatment as usual groups. Lower household income, more than one adult living in the home, and greater psychological quality of life were associated with increased retention in services ($p's < .05$).
Conclusions: Families who received more hours of services each week were less likely to drop out of community-based services, suggesting that frequent and regular contact with a service provider enhances service engagement for low-income families. Families may feel they are being provided with greater support from their service providers with frequent contact since they have more opportunities to practice strategies. Families with more than one adult living in the home were also more likely to stay in services, suggesting the need for respite and social supports for families living in single-parent households as a mechanism to support service engagement. Lastly, caregivers who reported higher ratings of psychological quality of life were more likely to stay engaged in services, suggesting the need for strategies to enhance quality of life for caregivers, including referrals to social work and mental health services to improve service engagement.

402.144 (Poster) Family Experiences on Autism Diagnostic Process and Early Intervention Services in South Korea
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Background:
While earlier identification and diagnosis of ASD allow early access to intervention services for children and families, delays in diagnosis are still common in Korea. Moreover, families of a child who received an early ASD diagnosis reported that information for early intervention was rare during the diagnostic process, which also contributed to delaying the service provisions. Such delays negatively impact the child's developmental trajectory, parental stress, and fiscal issues. In Korea, the need for a system to support early screening, identification, diagnosis, and intervention has been highlighted. However, a recent survey indicated families are experiencing challenges before, during, and after their child's ASD diagnostic process. Therefore, it is important to investigate families' experiences of ASD diagnosis and how that affected access to early intervention services in Korea.

Objectives:
This study aims to add literature in Korea that supports the idea that "the earlier that intervention begins in children's lives, the better the outcomes for children and their families (NRC, 2001)" by:

(1) Utilizing qualitative methods to explore the experiences of families who have a child with ASD on the identification, diagnosis, and early intervention services.

(2) Identifying barriers and facilitators to obtaining early identification/diagnosis and to receiving high-quality early intervention services.

Methods:
A semi-structured interview was used to explore the family's experiences with their child's ASD identification, diagnosis, and early intervention services. The participants include families in different regions across Korea who have a child under age 8 with an ASD diagnosis. Interview method will allow families to provide detailed information with open-ended responses to a consistent set of questions. The questions consist of items that focus on (1) initial concern about their children, (2) experiences with service providers, (3) perceptions of the services and the information they received, and (4) barriers and facilitators to early identification and early intervention.

Results:
Prior to diagnosis, families reported a lack of knowledge and resources to make informed decisions about diagnostic evaluation. They also experienced elevated stress, anxiety due to uncertainty about their child's development and the diagnostic process. During the evaluation, families raised concerns about the accuracy of diagnostic tools and environment for their child. They reported insufficient discussion with the providers about the evaluation results and financial burdens. After receiving the diagnosis, families felt less confident in understanding the results, experienced emotional difficulties accepting the diagnoses, and were confused about utilizing the evaluation reports to access appropriate services timely.

Conclusions:
Based on the preliminary findings, we propose three areas that can be developed in Korea. First, child at risk for ASD and their families may benefit from an early identification system that provides guidance on how to navigate from parental/caregiver concerns to accessing early intervention services. Second, a collaborative team approach for assessment may be created to involve families and stakeholders in the diagnostic process, which increases the opportunity to provide more individualized and accurate evaluation. Lastly, manualized procedure for families to access early intervention service is necessary after receiving an ASD diagnosis.

402.145 (Poster) Family Sex Communication As a Predictor of Sexual Knowledge and Self-Efficacy in Autistic Females
Research suggests that autistic youth trail their peers in obtaining medically accurate and timely sexual and reproductive health knowledge. Further, parents of autistic children have reported feeling unprepared to educate their children, and when sex education is received, autistic individuals commonly report feeling dissatisfied with the experience. There has been very little empirical focus on sexual education for autistic girls specifically. The current study was designed to explore factors that may guide the future design of effective sexual education programs for autistic girls. Parental communication about sexual health topics, known as family sex communication, has been shown to improve knowledge, safety behaviors, and relationships within non-autistic populations but this relationship has not yet been studied in autistic girls.

Objectives:

This study examined the impact of family sex communication on sexual knowledge and self-efficacy in young adult autistic women, as well as whether this association is moderated by autism symptom severity.

Methods:

Participants comprised 216 autistic women aged 19 to 39 (M=29.62, SD=5.40) who were recruited from the Simons Foundation Powering Autism Research for Knowledge (SPARK) cohort. Participants completed an online survey which included several previously validated measures. ASD severity was assessed via the Subthreshold Autism Trait Questionnaire (SATQ). Family sex communication was assessed via the Family Sex Communication Questionnaire (FSCQ). Sexual knowledge was assessed with the Test of Adolescent Sexual Knowledge (TASK). Self-efficacy was measured with the Sexual and Reproductive Empowerment Scale (SRES). A series of linear regressions were used to test study objectives.

Results:

Complete model results are reported in Table 1. Model 1 examined whether ASD symptom severity moderates the association between family sex communication and sexual knowledge. Lower levels of ASD traits were associated with greater levels of knowledge (β=-.20, p=.007). However, family sex communication was not associated with knowledge (β=.10, p=.17) and ASD severity did not moderate the relation between family sex communication and knowledge (β=.12, p=.08). Model 2 examined whether ASD severity moderates the association between family sex communication and self-efficacy. ASD severity interacted with family sex communication to predict self-efficacy such that the association between family sex communication and self-efficacy was stronger for those with higher levels of ASD symptoms relative to those with lower levels (β=.12, p=.049) (Figure 1).

Conclusions:

Results showed that young women with more ASD traits had less sexual knowledge than those with fewer traits. Family sex communication was associated with greater self-efficacy among young adult women with autism. Sexual self-efficacy, one’s belief in their own capacity to make decisions regarding sexual behavior, is believed to be critical for decreasing risky sexual behaviors and victimization. Further, those with higher levels of autism traits benefitted more from better family sex communication. Autistic girls and teenagers may benefit from sexual education that is tailored to their particular needs including more concrete information, visual aids, and teaching from trusted individuals who can assess engagement, coherence, and understanding in real time. Results provide foundational knowledge to support the design of parent mediated sexual education programs in childhood and adolescence for autistic girls.
Results: We conducted a cluster analysis using the Two-Step Clustering Algorithm (Shih, Cheng & Lai, 2010). The best model with good quality properties (ratio of sizes = 2.58) was taken into consideration, and two distinctive clusters emerged. The first cluster is made by 31 fathers (72.1% of the sample) displaying high levels of stress (especially concerning the representation of the child as difficult), a greater percentage of directive statements directed to the child, and fewer levels of symbolic play. Conversely, cluster 2 is made by 12 fathers (27.9% of the sample), showing less stress concerning child difficulties, fewer directives, and more symbolic play. Finally, through Linear Regression Models, we found that the directiveness level of cluster 1 but not of cluster 2 was associated with the child’s cognitive levels with a significant model (F(1,29)=9.05; p=.005). Specifically, cluster 1 increased levels of directiveness (beta=-0.49; t(30)=-3.01; p=.005) was negatively associated with cognitive functioning.

Conclusions: These findings may provide relevant clinical implications in implementing activities with children during the intervention considering different levels. On one side, interventions should focus directly on targeted cognitive domains to favor children’s developmental outcomes. On the other hand, interventions should indirectly consider paternal representations of the child to support fathers toward an increased understanding of the child’s difficulties. By comprehending the nature of parent-child interactions, it may be possible to devise more efficient intervention strategies. These findings may provide new insights considering paternal behaviors that need to be addressed in personalized interventions with fathers’ involvement.

Methods: We gathered paired data of 43 fathers (M=37.52 years; SD=5.34) during video-recorded interaction with their preschool children (M=40.74 months; SD=11.51), considering stress levels (Parental Stress Index - Short Form; Abidin, et al., 2006), affective quality (Emotional Availability Scales, Biringen et al., 2008), play (The Play Code, Bornstein & O’Reilly, 1996), and functional language (Penman Code, Penman, 1983). We analyzed the child’s cognitive functioning (Griffiths Mental Development Scales - ER, Luiz et al., 2006) and symptom severity (ADOS-2, Lord et al., 2012).

Results: VCI of autistic children was significantly lower than that of neurotypical children, p<.001. Father’s childcare participation was negatively associated with cognitive functioning of autistic children, M=5.39, SD=0.82) participated in this study. Children completed the Wechsler Preschool and Primary Scale of Intelligence–Fourth Edition (WPPSI-IV; Wechsler, 2012) and their language development was measured by the Verbal Comprehension Index (VCI) of the test. The caregiver who accompanied the child to the test completed an online questionnaire in which they indicated the child’s main caregiver(s) and family socioeconomic status (SES).

Conclusions: We found that fathers of autistic children participate less in childcare than fathers of neurotypical children. Having father as a regular caregiver predicts better language development in both autistic and neurotypical children. Among various types of caregivers, father seems to be especially critical in autistic children’s language development, and father’s childcare participation might play a protective role in language impairments in autistic children. Our findings highlight the importance of father’s role in autistic children’s
Feasibility and Acceptability of a Home-Based Collection Method for Identifying Risk Factors for Autism Spectrum Disorder

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Background:

Research on autism spectrum disorder (ASD) causality has been primarily discipline-specific, despite strong evidence of symptoms emerging from intersecting mechanisms. One barrier has been the challenge of collecting multiple biological and environmental samples from individuals at elevated likelihood for autism, particularly among geographically dispersed cohorts. To address this, we developed the Purdue Omnityping Kit for Testing (POcKIT) a user-centered data collection kit to support remote assessment of features associated with autism outcomes.

Objectives:

Here, we examined the (1) success, (2) feasibility, and (3) acceptability of sample collections using POcKIT.

Methods:

This study included 20 families from: (1) a national genetic risk cohort of children with fragile X syndrome (FXS, n=8), (2) a regional environmental risk cohort of children (ER, n=3), and (3) a regional cohort of children with autism (ASD, n=9). Ages ranged from 21-60 months (mean 42mo) and 90% were male. Each family completed a web-based survey with demographics and several clinical batteries, a phone interview, and at-home sample collections. POcKIT was designed based on input from diverse stakeholders and included materials necessary to measure child and caregiver saliva for genetics and α-synuclein assays; child stool for gut microbiome analysis; and soil, water, and child toenails for heavy metal and pesticide assays. Instructional videos created for each collection were loaded onto a tablet monitoring user engagement. Caregivers shipped both frozen and non-frozen samples to a centralized processing site using pre-paid materials. Outcomes included: success (collection compliance, meaningful result), feasibility (user-rated ease, video engagement metrics), and acceptability (favorable evaluation). Key research questions were: (1) Was POcKIT successful (90% usable samples) and feasible (80% positive) across income and cohort? (2) Did engagement metrics predict successful sample collections? (3) Were users satisfied with the experience?

Results:

Upwards of 95% of families successfully collected samples. 85% of caregivers rated child saliva collection as “Difficult”/“Very difficult” on 5-point scale and this varied significantly by cohort (ASD 100%, FXS 87.5%, and ER 12.5%) but not by income. In contrast, fewer caregivers found stool (25%), soil (13%), water (7%) or toenails (21%) difficult to collect. Ratings for these collections did not vary by cohort or income.

Participants spent an average total of 47 minutes watching the 40 minutes of instructional video (range: 7-84 minutes). Metrics of success and feasibility were not associated with video use metrics. Most caregivers were “Very satisfied”/“Extremely satisfied” with all aspects of the study including overall experience (75%), length of time for each of the components [surveys (65%), phone interview (74%), and collections (55%)], quality and clarity of the instructions (95% and 85%, respectively), and support from our team (100%).

Conclusions:

Overall, families reported their experience with POcKIT as practical and acceptable, yielding high rates of successful sample collections. Modifications will need to be made to child saliva collections and to the length of study components prior to scaling up the study. The findings from this study bring us one step closer to personalizing risk assessment and treatment by providing a potential model for large-scale remote data collection across diverse users.
**402.149 (Poster) Fragmented Services and Parents' Marathon for Delivery of Early Intervention Services for Children on the Autism Spectrum in Greece**

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Background: The design and implementation of early intervention services is crucial for promoting the development, learning and inclusion of children on the autism spectrum. Such programmes should involve the activation of a variety of support services according to children’s and their parents’ needs which should be provided in their natural environments, including the home and community early childhood education and care settings with the support of education professionals. Yet, few studies at an international level focused on the experiences of parents with children on the autism spectrum in relation to early intervention services highlighting the need to ensure high quality support services for meeting the needs of the children and their families.

Objectives: Our aims were twofold: a) to conduct a qualitative study to examine the lived experiences of parents in relation to early intervention services who have a child on the autism spectrum attending general early childhood education settings in Greece and b) to include in our sample parents of Greek origin as well as parents of culturally and linguistically diverse children with autism.

Methods: Data were collected through semi-structured interviews with 13 parents of children on the autism spectrum who attended a class at general early childhood education settings in Greece during the spring term of the school year 2021-2022. The duration of the interviews with the participants lasted approximately 1 hour and thematic analysis was employed for the analysis of the collected data.

Results: The thematic analysis revealed that, first, parents described that existing services are fragmented and chaotic without being provided timely so that early intervention services are ensured. In this way, parents reported that they experience psycho-social stressful situations in their interactions with the services and with the professionals in the health, care, and education sectors. Another dimension that parents unveiled was their need to be fully engaged in high quality services during the assessment processes, in decision-making about their children’s education in child-care settings and early childhood education naturalistic environments, and not only to be passive informants of their child’s developmental profile. Lastly, parents expressed the need to belong in supportive network services with an emphasis on the whole family and their empowerment, so that they can better promote their child’s life-long development as well as educational and social inclusion.

Conclusions: Our study demonstrated that there is a lack of appropriate and co-ordinated high quality early childhood intervention services. Parents in Greece tend to experience many barriers, and, therefore, they described the processes from locating to activating these services as a marathon. It is expected that these findings will contribute to the effective design of inclusive and sustainable early childhood intervention policy, practices, and services for children on the autism spectrum and their families in Greece.

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**402.150 (Poster) Gender Differences in the Portrayals of Autism in the Autism UK Press Corpus**

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Background: There is increasing recognition that the identification, diagnosis, study, and understanding of autism are heavily skewed towards the male gender. A similar bias is also found in media and press representations of autism, which reflect, construct and reconstruct public attitudes and beliefs towards autistic people and play a critical role in their acceptance and the successful integration into education, work, and society.

A recent study by our team (Karaminis et al., 2022) used corpus-based and critical discourse analysis methodologies to examine lexicogrammatical patterns in the portrayals of autism in British newspapers between 2011-2020. It found that accounts of autism in British newspapers focused on children - and especially boys. This gender bias was more pronounced in tabloids than in broadsheets and in right-than left-leaning newspapers, and it also decreased slightly over the years.

Objectives: In a follow-up study, we aimed to examine gender differences in the press portrayals of autism in further detail. More specifically, we aimed to examine how the representations of autism in British newspapers differed when newspapers referred to autistic boys vs. girls, as well as to mothers vs. fathers of autistic children.

Methods:
We analysed the Autism UK Press Corpus, a collection of all documents (around ~24K) referring to autism in ten major national newspapers between 2011 - 2020. We used a corpus-based critical-discourse-analysis framework, which involves a series of interconnected qualitative and quantitative analysis stages, to construct emergent representations of the terms “autism” and “autistic”.

In this study, we analysed separately corpus samples (~2,800) in which the terms autism and autistic co-occurred with words denoting age, gender and family roles and falling into four broad categories: BOY, GIRL, FATHER and MOTHER. We compared the prevalence of various attitudes and underlying discourses (identified based on the annotation scheme of the original study) in BOY vs. GIRL and FATHER vs. MOTHER samples. Similar to the original study, we also considered changes over time and differences in reporting style (tabloids vs. broadsheets) and political orientation (left- vs right-leaning).

Results:

Our results suggested that newspapers tended to discuss autistic girls in contrast to boys, i.e., as a newly-identified category of autistic individuals, which is different from boys. Furthermore, newspapers often highlighted “girl-specific” topics such as diagnosis and masking. With regards to parents of autistic children, both mothers and fathers were often discussed as someone conferring a risk for or causing their child’s autism through their lifestyle choices; however, mothers were associated with a more diverse range of liabilities than fathers. Finally, mothers, rather than fathers, were presented as someone who were dealing with challenges arising from their child’s autism, such as the diagnostic process or the lack of support and acceptance, and were also discussed as either victims or perpetrators in accounts of violent incidents.

Conclusions:

Our results offer new insights into gender-related biases in the (predominantly negative) press portrayals of autism and autistic children. We believe that these findings are useful for autism advocates and highlight the importance of employing intersectional research frameworks.

402.151 (Poster) Peer Support Provided By People with Autism and Intellectual Disabilities to Increase Research Engagement: A Scoping Review

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Background: Peer support is any organized method of support provided by a person with similar lived experiences. When provided formally, it can fill a much needed gap in specialized services for Autistic people as an effective approach that is founded on the concept that someone with lived experience can best understand the unique perspective of the individual. Peer support provides a mechanism to engage stakeholders in research.

Objectives: The objective of this scoping review was to identify important factors of peer support provided by Autistic individuals that could translate into methods for research engagement and then to organize this into a Peer Support Toolkit for Research Engagement.

Methods: A scoping review was completed using the guidelines for PRISMA-SCR. The search was developed initially for PubMed (NLM) and then was translated to ERIC (EbscoHost), CINAHL (EbscoHost) and PsycInfo (EbscoHost) using a combination of keywords and subject headings. The search resulted in 2,887 references that were eligible to screen. Studies were screened by title and abstract by two blinded and independent reviewers using Covidence. If there was a conflict between reviewers, a third reviewer was involved in the consensus discussion with the two initial reviewers. This process was repeated for full text article screening and article selection. For inclusion in the review, peer support had to be provided by an individual with Autism and/or an IDD for another Autistic individual. Included articles were extracted and coded for information on characteristics, strategies, and roles of peer supporters.

Results: We identified 26 articles that met the inclusion criteria. There were 10 reoccurring characteristics of a peer supporter identified during the coding process across the 26 articles. These included: 1) having a similar lived experience (n = 15) to the other person; 2) self-efficacy and self-advocacy (n =11); 3) reciprocity (n = 9); 4) friendship/comradery (n = 8); 5) role modeling or education (n = 7); 6) support for specific tasks (n = 7); 7) relationship building (n = 6); 8) creating a safe space for the peer (n = 5); 9) normalization of disability and positive disability identity (n = 5); and 10) commonality (n = 3). Coding identified 5 main peer support roles and strategies across the included articles. These included: 1) communication, 2) sharing experiences, 3) helping peers to learn, 4) peer development and 5) creating a welcoming environment. Coding across the articles also identified two main types of supports and accommodations for peer supporters. These included 1) individual supports and 2) environmental supports and accommodations.

Conclusions: Peer support provides a key mechanism for engaging stakeholders in inclusive research teams, which is essential for outcomes that are effective and meaningful. This scoping review identified the characteristics, as well as roles and strategies used by peer supporters. These findings were utilized to create a research-based toolkit to support the engagement of Autistic people on research teams.
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Background:

Children with autism spectrum disorder (ASD) require more types of special health services and interventions than their peers due to the complexity of ASD and comorbidities. However, their health needs are often unrecognized or unmet, especially in low-resourced setting countries like Vietnam. Unrecognized health needs and unavailability of services may prevent the accessibilities of children with ASD to health care services.

Objectives:

This study aims to explore health issues that children with ASD in Vietnam encountered and health seeking behaviors of their parents.

Methods:

This study was a cross-sectional research using data collected from caregivers of children with ASD using a structured questionnaire. The questionnaire was adapted from The Need Assessment tool developed by Autism Speaks. The study was conducted in 9 provinces/cities in Vietnam, including Hanoi, Nam Dinh, Ninh Binh, Thanh Hoa, Quang Binh, Quang Nam, Hue, Ho Chi Minh City, and Can Tho. Data were collected from October 2019 to January 2020. 413 responses were used for data analysis. Qualitative interviews and observation were supplemented for the survey data.

Results:

About three quarter (72.1%) of the children had other disability or comorbidities. The most common comorbidities reported were: ADHD: 43.2%, sleeping disorder: 31%, gastrointestinal difficulties 25.3%, and eating disorders 23.1%. About half of caregivers reported that they utilized public health facilities for medical treatment (24.5%) and rehabilitation (29.5%) for their children. More than 84.7% used private special education for their children’s intervention and they paid services by themselves. About half of families delayed treatment/intervention for their children with various reasons, in which one quarter (23.8%) reported no service available at their places, 21.4% lacked information on services availability and 16.4% could not afford service costs.

Conclusions:

Children with ASD have various health needs, including services for ASD and other comorbidities. Enhancing health care services, including capacity building for health care providers on ASD and other comorbidities, and developing referral pathways, is critical to meet the needs of the children.

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Background: Does language influence the way we think? Can language be a tool for stigmatization or inclusion? Does it contribute to the creation of a system of discrimination or exclusion, or does it simply reveal and thematize it? These discussions lead us to explore how “news” related to autism circulates in the media, specifically in the written press. In recent years, the fight for rights and the construction of citizenship in the field of disability is also waged in language, in the framework of intertextuality, the media and social networks.

Objectives: Analyze the informative treatment that has been given to autism in a mass communication medium in Spain (El País, digital version) during 2019 and 2020, considering its possible impact on the opportunities for educational and social inclusion of autistic people. We chose this newspaper because according to statistics it is the most widely read in Spain.

Methods: A screening process was carried out with inter-judge evaluation. Content analysis: Categories include type of content addressed, projected social image, inclusion, considering the articles they write about inclusion (school, work, in the community) or experiences of stigmatization (situations of bullying, abuse) Corpus analysis through lexicometric analysis using the Voyant Tools tool.

Results: In relation to the content, the articles are mostly visibility, both in 2019 (67%) and in 2020 (73%). A very significant reduction has also been observed in articles on the causes of autism, which were 10% in 2019, with none (0%) in 2020. The percentage of articles whose central theme is intervention in autism has been remained relatively stable, being 17% in 2019 and 27% in 2020. If we analyze the social image, a vulnerable image of autism is projected by 53% in 2019 and 27% in 2020. There has also been an increase in articles highlighting
that these people require special attention, going from 20% in 2019 to 64% in the first year of the pandemic. Impersonal articles, mainly focused on the false link between vaccines and autism, fell from 7% in 2019, disappearing in 2020. The five terms that increased the most in their normalized relative frequency within the 2020 Corpus compared to 2019 were “people”, “TEA”, “disability”, “home” and “quarantine”. The five terms that most decreased their presence in the 2020 Corpus compared to 2019 were: “father”, “Greta”, “years”, “euros” and “education”.

Conclusions: We believe that the way in which the issue of disability in general and in particular the issue of autism is treated in the mass media is extremely important. What is at stake is not merely issues of political correctness or style norms, but the sensitivity to understand differences and build inclusive practices, cultures and policies. To the extent that people with ASD, their families and professionals and researchers in the area participate more in the public debate in the media, myths will be demolished and awareness of the subject will be contributed based on evidence and the real needs of people and improvements in their quality of life.

402.154 (Poster) How Older Sibling’s Autism and ADHD Traits Associate with Infant Sibling’s Adaptive Behaviour during Early Childhood

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Background:

Autism and attention deficit/hyperactivity disorder (ADHD) are both highly heritable neurodevelopmental conditions. Both conditions are characterised by difficulties in adaptive functions. Previous studies have shown that individuals with autism show difficulties in adaptive behaviour, including daily living, socialization, communication and motor skills. There is evidence found that individuals with ADHD show similar difficulties and that the difficulties might increase when combined with autism diagnosis. Having a family history of autism and/or ADHD increase the likelihood of being diagnosed with these conditions. Additionally, it has been found that older sibling’s adaptive skills associate with their infant sibling’s adaptive skills in families with a history of autism. In this study we aim to explore how older sibling’s autism and ADHD traits associate with infant sibling’s adaptive skills across early childhood.

Objectives:

To investigate how older sibling’s autism and ADHD traits associate with early childhood adaptive skills in infants with family history of autism and/or ADHD.

Methods:

The study included 408 infant participants (male=211, female=197) and their older siblings with autism (n=250), ADHD (n=31), both (n=21) or neither (n=106) from the British Autism Study of Infant Siblings (BASIS) and Studying Autism and ADHD Risks (STAARS) studies. Infant adaptive behaviour skills were measures at 8-, 14-, 24- and 36-months using the Vineland Adaptive Behavior Scales, Second Edition (VABS-II). Adaptive behaviour composite, daily living, socialization, communication and motor skills domains were used in the analysis. For older siblings’ autism traits parents completed the Social Communication Questionnaire (SCQ) lifetime version and Conners 3 parent/caregiver questionnaire was used for hyperactivity/impulsivity and inattention.

Bivariate correlations between older sibling’s autism/ADHD traits and infant sibling VABS-II scores were analysed using bivariate correlations, with the intention of further analysis using structural equation modelling.

Results:

Infants who had older sibling with high autism traits showed lower scores for adaptive behaviour, daily living, socialization, communication and motor skills at every time point except at 10 months. On the other hand, higher inattention in older sibling associated with lower scores in adaptive behaviour, daily living, communication and socialization at 24 months, but did not associate with motor skills at any time point. Older sibling hyperactivity/impulsivity did not associate with any of VABS-II domains.
Conclusions:

In this study we found that more severe older sibling’s autism symptoms associate with difficulties in infant sibling’s adaptive skills across the early childhood, starting at 14 months of age. Older sibling’s inattention also associates with difficulties in adaptive skills during toddlerhood. Further analysis needs to be done to better understand how these associations across infant sibling’s childhood.

402.155 (Poster) How about Us? Exploring the Mental Health of Parents with Children with ASD
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Background: Previous studies have found that parents of children with ASD report greater distress than parents with typically developing children (Estes et al., 2013). As parental psychological well-being is closely tied to the quality in relation to the child (Hickey et al., 2019), it is important to understand the mental health of the caregivers and explore factors by which it is influenced.

Objectives: This study aims to explore the mental health of parents whose child has been diagnosed with ASD.

Methods: Participants were recruited from a larger genetic cohort targeting ASD multiplex families in Korea. Therefore, parents and their children received a thorough assessment, including the Autism Diagnostic Observation Schedule, various questionnaires to measure autistic symptoms (i.e., Broad Autism Phenotype Questionnaire, Autism Quotient, Social Responsiveness Scale), as well as overall functioning and behavioral characteristics in their child. Parental mental health problems were assessed using the Korean-Symptom Checklist 95 (K-SCL 95), a self-report questionnaire that screens for 20 mental health conditions. Participants were coded as having difficulties with mental well-being if they received a T-score over 60 in any of the conditions. Independent t-tests and ANCOVA, covarying for age, were used to explore the clinical characteristics between parents with and without mental health problems.

Results: A total of 186 parents of children with ASD, whose ages ranged from 26 to 53 years, were included for analysis. Based on the K-SCL 95, 64.5% of the parents (n=120; age M=38.9, SD=5.17) were found to have at least one mental health condition at a concerning level. While 72.5% of the parents with mental health problems presented T-scores greater than 60 in more than two conditions, the average number with concerns was five conditions, with a wide range of 1~19. Mothers showed more vulnerability to mental health problems than fathers. Manic episodes (42.5%) were the most frequent and followed by stress vulnerability (40.8%), interpersonal sensitivity (39.2%), anxiety (38.3%), and depression (37.5%). When comparing the group of parents with and without mental health problems, those with mental health concerns had higher self-reported autistic traits (p < .001~.011) and reported greater difficulties related to pragmatic language in their spouse (F(1,177)=6.42, p=.012). However, the two groups showed no significant differences in the age of their child with ASD, number of children, number of affected children, the severity of ASD symptoms, or their child’s level of functioning (i.e., intelligence, adaptive behaviors).

Conclusions: A large proportion of parents with children with ASD experience concerning levels of various mental health conditions. While clinical characteristics of the child diagnosed with ASD did not differ between the two parental groups, those with mental health problems also presented higher scores on various self and spouse-reported questionnaires measuring autistic symptoms than parents without mental health problems. Therefore, parents of children with ASD also require support to address areas with difficulty to promote psychological well-being.

402.156 (Poster) Identifying Disparities in Care during Covid 19 for Families with Children with Developmental Disabilities
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Background: The 2019 SARS CoV-2 (COVID-19) pandemic created barriers to care for children with autism spectrum disorder (ASD), while highlighting long-standing racial and economic disparities and inequities. This study aimed to examine the relationship among sociodemographic factors, psychological factors, unmet medical and educational needs, and patients’ quality of life to identify disparities and barriers to care for children with ASD during COVID-19

Objectives:

1. How has COVID-19 impacted the overall quality of life and barriers to care for children with developmental disabilities?

2. Are there disparities in the impact of COVID-19 among families with children with developmental disabilities across demographic health factors?
Methods: Participants: The patient’s caregivers (n = 184) from CARD at Kennedy Krieger.

- Measures: (1) COVID-19 Patient Questionnaire – Survey designed for quality improvement in addressing family needs and service satisfaction during COVID-19. (2) Demographics – Drawn from medical chart review.
- Procedure: The patient’s caregiver received the COVID-19 patient questionnaire Qualtrics link electronically with their Zoom link prior to their appointment.
- Variables: Outcome – Quality of life; Psychological challenges Predictors – (1) Psychological challenges (including sleep, appetite, and mood) (2) Unmet medical needs (3) Distance learning (4) Family managing (5) Race (6) Insurance
- Response Scale: Quality of Life: 1 = severe to mod worse to 5 = mod to great improvement; Distance Learning & Family Managing: 0 = Doing well 1 = Getting by 2 = Really struggling
- Analyses: Descriptive statistics and multiple linear regression analyses in STATA

Results: The study did not find that sociodemographic factors, such as race, ethnicity, and insurance type, were associated with the overall quality of life for children with ASD. This study suggests that the majority of caregivers felt the medical and educational needs of their children with ASD were met or they were “getting by.” Significant percentages of the families however, were experiencing challenges. Almost a quarter (24%) of families were struggling to manage daily needs, 30% had medical concerns that needed to be addressed, and 36% were struggling to provide distance education. Caregivers who were having difficulty with receiving medical services, family managing, and distance education during the COVID-19 pandemic reported higher psychological challenges and decreased quality of life.

Conclusions:

In our limited study we found that Caregivers who were having difficulty with receiving medical services, family managing, and distance education during the COVID-19 pandemic reported higher psychological challenges and decreased quality of life.

402.157 (Poster) Identifying Gaps in Oral Care Knowledge, Attitudes, and Practices of Latino/a Parents/Caregivers of Autistic and Non-Autistic Children

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Background:

Oral care is the most prevalent unmet healthcare need in children. Gaps in Latino/a parental oral care knowledge and practices may contribute to increasing oral health disparities experienced by Latino/a children with and without disabilities.

Objectives:

This pilot study used data from a survey to examine the knowledge, attitudes, and practices about oral care of Latino/a parents/caregivers of autistic and non-autistic children to identify gaps to focus future oral care intervention.

Methods:

Sixty English-speaking Latino/a parents/caregivers with an autistic or non-autistic child between 4 and 14 years (n = 31 autistic, n = 29 non-autistic) completed a questionnaire on oral health knowledge, practices, access to care, and demographics. Caregiver responses were compared, and gaps in knowledge and practices were identified.

Results:

There were no significant differences in parent age, child age, income, insured status, or overall knowledge scores, only a significant difference in education (p = 0.02), with the autistic group reporting less. Scores for knowledge, attitudes, access, and practice were all nonsignificantly positively correlated, as was attitudes with access and practice. However, knowledge and attitudes were significantly negatively correlated. Additional significant findings were parents who had lower income and education had lower oral knowledge scores, decreased frequency of dental visits, increased feelings of being discriminated against, children with increased fear of the dentist, and decreased ease of finding a dentist.

Conclusions:
Factors such as income, education, ethnicity, and having an autistic child can influence what Latino/a parents and caregivers know about oral health and how their children experience receiving dental care. Latino/a parents/caregivers of autistic and non-autistic children report barriers to dental care, including difficulty attending visits or feeling stigmatized by their dental provider due to their ethnicity. Fear of the dentist is significantly correlated with autism diagnosis and lower social demographics of the parent, and may contribute to a reduction in preventative oral care visits as well. Health care providers should consider these perspectives when providing care to this population to mitigate further oral health inequities.

402.158 (*Poster*) Identity-First Versus Person-First Language: An Examination of Abstracts from 11 Autism Research Journals

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**Background:** The most recent 7th Edition of the *Publication Manual of the American Psychological Association* specifically emphasized the intentional choices researchers make when choosing to use person-first language (PFL) or identity-first language (IFL). While PFL was once the preferred approach in autism research, advocacy primarily from autistic stakeholders has highlighted the importance of IFL to many autistic individuals. Existing research has focused on surveying large samples of autistic and non-autistic stakeholders to learn more about language preferences. However, approaches examining changes in how autistic individuals are referred to in research publications remains limited.

**Objectives:** This study analyzed the abstract text from research studies published in 11 autism research journals to identify trends in use of PFL and IFL. We examined articles published in the last three decades to identify potential patterns of change across journals.

**Methods:** We selected 11 journals that publish research related to autism and extracted publication years and full abstract data (*n = 11,906*) using the Web of Science. Journals include (with earliest publication year and sample size) *Advances in Autism* (AdiA; 2017; 138), *Autism* (2001; 1,485), *Autism & Developmental Language Impairments* (ADLI; 2017; 113), *Autism in Adulthood* (AuiA; 2019; 99), *Autism Research* (AR; 2008; 1,418), *Education and Training in Autism and Developmental Disabilities* (ETADD; 2010; 430), *Focus on Autism and Other Developmental Disabilities* (FOCUS; 2008; 336), *Journal of Autism and Developmental Disorders* (JADD; 1991; 5,280), *Molecular Autism* (MA; 2010; 640), *Research in Autism Spectrum Disorders* (RASD; 2007; 1,741), and *Review Journal of Autism and Developmental Disorders* (RJADD; 2015; 226). We excluded any in press publications (as of October 2022) and removed non-peer reviewed articles. We used Python to search for text associated with PFL (e.g., individual with autism) and IFL (e.g., autistic individual). We categorized abstracts into four categories based on having at least one mention of PFL, IFL, both, or neither. We also searched for “on the [autism] spectrum,” given that it has been highlighted as a preferred intermediary term.

**Results:** Over the years, some journals reported almost complete use (*Ms > 85%*) of PFL (FOCUS, ETADD, RJADD) or IFL (AuiA). Other journals showed an initial preference for PFL with an increase in IFL in the last five years that either approached (AdiA, ADLI, AR, JADD, MA, RASD) or surpassed (Autism) PFL. Abstracts using both remained relatively low across years and journals (*M = 11%). Use of “on the [autism] spectrum” remained low across journals (*M = 5%) with all journals below 3% except for AdiA, ADLI, and AuiA (8-11%). Publication trends will be further discussed during the presentation.

**Conclusions:** Language use across autism research journals highlights an increasing trend of IFL and a decreasing trend of PFL. However, the rate of this trend was not consistent across journals nor was the trend apparent in all journals. Findings highlight the importance of considering the role that language plays in writing about research involving autistic individuals and showcases the changing landscape in how researchers write about autism in scholarly publications.

402.159 (*Poster*) Impact of Companion and Assistance Dogs on Caregiver Stress in Autism Spectrum Disorder (ASD)


**Background:** Elevated levels of stress have been well-documented in caregivers of individuals with special needs; prior research has shown that assistance-dogs, trained to perform specific tasks to help their human partners, can reduce perceived stress and cortisol concentration levels in autistic individuals as well as their caregivers/parents (Tseng, 2021, Fecteau et al., 2017, Viau et al., 2010). Yet, given the prohibitively high costs in time and resources required, well-trained assistance-dogs are beyond the reach of many families. While psychosocial benefits arising from human-canine relationships have been reported from both companion- and assistance-dog bonds, empirical data comparing the impact of assistance and pet-dogs on caregivers and families affected by ASD is lacking.

**Objectives:** Our goal was to deepen our understanding of how companion and trained assistance-dogs impact the lives of ASD families. We hypothesized that the potential benefits of canine companionship on caregiver well-being may improve overall family outcomes through a mediating pathway. However, these effects will vary considerbly with individual human and canine characteristics.
Methods: Primary caregivers (N=637) of autistic individuals were recruited from the Simons Foundation Powering Autism Research for Knowledge (SPARK) online research initiative (SPARK Consortium, 2018). Parents/Caregivers (Male: N=55; Female: N=582) from SPARK families with at least one canine in the household provided informed consent online. Families with a trained assistance-dog (Male Child: N=146, Mean Age=11.88±3.56 years; Female Child: N=89, Mean Age=11.32±2.82 years) and those with a companion-dog (Male Child: N=319, Mean Age=11.59±3.66 years; Female Child: N=87; Mean Age=11.18±3.60 years) were asked to complete online surveys consisting of self-report and parent-report questionnaires on stress and coping, human-canine interactions and relationships, as well as family demographics, medical history, and life events. We also asked caregivers to provide phenotypic data, training, and signalment for the primary canine companion/assistance dog for the autistic child.

Results: After covarying for child age and sex, families with assistance-dogs reported significantly lower levels of stress F (3, 637) = 426, p = .005) on the Autism Parenting Stress Index (APSI; Silva & Schalock, 2012), a measure of parenting stress specific to ASD. However, we did not find a significant difference F (3, 606) = 1.086, p = .354) between caregivers with assistance and companion dogs as assessed by the Perceived Stress Scale (PSS; Cohen, 1994), a general measure of the degree to which situations are appraised as stressful. Data analysis is ongoing and we will examine variability in how caregivers handle difficult experiences (COPE Inventory; Carver, 2013) as related to their perceived stress levels.

Conclusions: Caregiver stress, coping, and resilience are key factors in ASD family outcomes; our data suggest that both companion- and assistance-dogs may help to relieve some of the multifaceted strain experienced by caregivers and their families. Further analyses will evaluate the canine traits and behaviors that correlate with positive outcomes on family survey measures and how these outcomes are modulated by human phenotypes. Ultimately, these data may be used to inform the development of improved assistance-dog selection and training approaches and to help match pet-dogs with family needs.


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Background: During the COVID-19 pandemic, governments around the globe, among which Greece, implemented strict measures such as lockdowns (i.e., stay-at-home mandates), physical distancing, mask protection, and closure of non-essential businesses [1]. Even though these measures aimed to limit the transmission of the virus, these measures, especially lockdowns, may have left a substantial negative impact on daily life, psychosocial state, education, and mental health of parents and autistic children [2,3,4,5].

Objectives: In the present study, we further characterize the experiences of parents and autistic children, and adolescents associated with pandemic-related disruptions. Our goals were: (1) to characterize the effects on various aspects of family life, children’s functioning, psychosocial state, behavior, education, and development following the changes in daily routines as dictated by the Greek lockdown and (2) to contribute to the growing literature on the concerns and challenges of families of autistic children in the post-COVID-19 era providing evidence to shape future interventions.

Methods: Participants. The parents of 154 Greek-speaking autistic children and adolescents participated in the study (123 males and 31 females) (Mage: 6.29, Age range: 2-17 yrs.). Materials. An online parent survey constructed via google forms was sent out at the height of the lockdown (05/20/2020-01/02/2021). The questionnaire consisted of 82 questions divided into four sections: (i) information on COVID-19 and containment measures, (ii) managing quarantine with the child, (iii) children’s functional skills: feeding, sleeping, toileting, (iv) sensory issues and self-regulation, (v) cooperation and support from intervention services and special education, (vi) school, the management of the academic assignments and homework, (vi) parental professional activity, (vii) parent’s affective status during lockdown (stress) and support.

Results: During the COVID-19 lockdown, several autistic children remained calm (42.2%), while a sufficient number of children were stressed, upset, asked repeated questions, and even became aggressive (21.4%). Even though some parents during quarantine had the opportunity to communicate and play (51.3%) more with their autistic children being calm (due to the reduction of social demands) (25.3%), a significant percentage of children (36.4%) exhibited more hyperactivity than prior to the lockdown. Additionally, parents reported an increase in autism-related symptoms (stereotypic behaviors and echolalia (26.6%), tantrums (21.4%), and whining (31.2%)). Moreover, parents reported sleep disturbances with autistic children sleeping later than usual (44.1%) and an increase in sensory issues, such as auditory, tactile, and motor (43.4%). Moreover, most intervention and educational programs were interrupted during the lockdown (50%). When educational support was available in a virtual form, 36% of the children displayed aggressive behavior during those lessons. Finally, some parents (14.9%) found managing their children's behavior during the quarantine challenging.

Conclusions: Study findings showed that disruption of daily routines and services due to the COVID-19 lockdown had been proven especially challenging for Greek autistic children and their families. Most parents of autistic children and adolescents reported significant difficulties and concerns regarding their children’s developmental, behavioral, psychosocial setbacks due to COVID-19 lockdown. The impact of the restrictive measures of COVID-19 on autistic children and their families is still unfolding, with concerns regarding long-term effects on various aspects of their lives.
402.161 (Poster) Impacts of the COVID-19 Pandemic on Autistic Children and Youth, Their Families and Their Service Providers: Perceived Experiences and Recommendations

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Background: The impacts of the COVID-19 pandemic on autistic children/youth and their families as well as on service providers are not yet well-understood.

Objectives: This study aimed to identify lived experiences of autistic children and youth, their families and their service providers in the pandemic. We elicited perceived impacts of the pandemic on service access and support provision, and recommendations for pandemic recovery and preparedness for future health emergencies.

Methods: Autistic children/youth, parents and community service providers (e.g., early intervention, professional services, school providers) supporting children/youth and families were qualitatively interviewed. Participants were recruited from autism diagnostic and service organizations. Thematic analysis determined key themes in the data.

Results: Two autistic youth, 13 parents of autistic children/youth, and 18 service providers participated in interviews. Findings reveal that the pandemic and public health protocols resulting from the pandemic, imposed largely negative impacts on autistic children/youth and their families as well as on the practice and well-being of service providers. Challenges required prolonged efforts to cope, as many services were discontinued or reduced during pandemic ‘peaks’. Families were unclear about what services were available, generally with insufficient resources. The rapidly shifting environment and disruption in routines and services were challenging for children/youth, and for some, were difficult to understand and navigate. Parents reported their children to variably experience more problematic behaviors due to increased anxiety, disrupted routine and interrupted support, which in turn increased stress for parents as they tried to find ways to support their children. Service providers rapidly shifted practice, including transition to technology-mediated supports that incurred service delivery challenges. Safety protocols, such as the use of personal protective equipment (PPE), rendered service providers’ concern about their ability to optimally engage with children/youth. Resiliency emerged as families relied on individual (e.g., learning to create socially distanced activities) and community assets (e.g., one-to-one online school support) to buffer negative impacts. Likewise, service providers became creative and adapted supports in seeking to better meet children’s needs. In moving forward, all participant groups generally sought continued use of technology in service delivery, as appropriate, given convenience and access, but also raised concern with its ongoing use in some instances and with some individuals. Social narratives and other approaches to help children/youth better understand public health protocols were recommended, as were self-care protocols for parents and service providers. Timely, clear, and tailored communication regarding service delivery changes was desired.

Conclusions: Results highlight the need for autism-focused supports in pandemic or other disaster-related circumstances, including technological and preparedness capacity within community, therapeutic and educational sectors. Recommendations amplify the need for clear and targeted communication of risks, viable safety protocols, mental/psycho-emotional wellness strategies, and guidelines for person and family centeredness in emergent and shifting circumstances. There is critical need for principle-based pandemic recovery supports for autistic children/youth and their families, and proactive planning to ensure that when faced with pandemics or other geo-health crises or disasters, services are maintained and adapted to ensure that the support needs of autistic individuals and their families are met.

402.162 (Poster) Integrating Acceptance and Commitment Therapy (ACT) and Parent Meta-Emotion Philosophy (PMEP) with Parent Training

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Background: Parents of autistic children experience significantly more stress when compared to parents of typically developing children. It is critical that parents have strategies to care for themselves to be effective in caring for their autistic children. With ACT and PMEP parent coaching, the goal is to increase psychological and emotional flexibility in parents while building the parent-child relationship.

Objectives: A virtual parent training intervention featuring ACT and/or PMEP was created to teach effective parent coaching skills. We anticipated parent training would lead to reductions in child negative behavior across intervention groups when compared to the control group.

Methods: Our sample consisted of 51 mothers representing 12 US states. All had at least one autistic child between the ages of two-five years for whom they were the primary caregiver (seven participants had two children who fit this criteria). Participants were recruited through social media and through local autism agencies. All interactions with participants were remote. After 2 weeks of baseline data collection, mothers were randomly assigned to one of four groups: (1) ACT & PMEP, (2) ACT, (3) PMEP, or (4) control group. Live ACT training occurred virtually for approximately 60 minutes, weekly during the 4-week intervention period (totaling 4 hours group training). Live PMEP parent group training occurred virtually for approximately 60 minutes during the 4-week intervention period (totaling 4 hours group training). Further implementation of ACT and PMEP was employed through parent-led, shared reading of widely available
children’s books by all groups. Mother assessments of child maladaptive behavior occurred prior, during, and following treatment (totaling seven measurements). A four-group latent growth curve model with Bayesian estimation was applied to examine the differences in the changes of child maladaptive behavior between the three intervention groups and the control group. The model fit the data satisfactorily ($p_{ppp} > .45$, and $CFI > .96$). The four groups started similarly at baseline in behavior as indicated by non-significant dummy-coded group effects. The model was specified to have two slope factors. The first piece examined changes from the baseline to the third measurement and the second piece examined changes from the third to the seventh measurement. The ACT group reduced child maladaptive behavior by $\beta_{1} = -2.09$, $p = .03$, $95\% CI [-4.26, -1.0]$ in the first three measurements, while the combined group, ACT & PMEP, reduced maladaptive behavior by $\beta_{2} = -2.24$, $p < .01$, $95\% CI [-3.77, -66]$ from the third to the seventh measurement.

Results: Parent training intervention that combined ACT with PMEP was more effective than either intervention alone in reducing child maladaptive behavior.

Conclusions: This novel design intervention was successful in identifying solutions for mothers and their autistic children through ACT and PMEP in a virtual parent training model. Our findings show that the combination of psychological flexibility with emotion coaching was superior to either intervention alone in reducing child maladaptive behavior.

402.163 (Poster) Intergenerational Pathways to Emotional Regulation: Implications for Parenting Stress and Preschoolers’ Challenging Behaviors
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Background: Parents play a significant role in shaping children’s behaviors and their responses to emotions. Research has established a strong, bi-directional effect between parenting stress and children’s challenging behaviors. Research also suggests the ways in which parents respond to their own emotions to accomplish goals, termed emotion regulation (ER), may affect the same process in their children. The role of parents in the development of ER is especially pronounced during the preschool period, and among autistic children. However, research has yet to clarify how both parent and child ER shape the relationship between parenting stress and children’s challenging behavior.

Objectives: This study aimed to explore the extent to which parent and child ER explain the pathway between parenting stress and children’s challenging behavior, among culturally diverse families of children with developmental delays (DD), including autism spectrum disorders (ASD).

Methods: Baseline data from 265 families enrolled in a multisite intervention study were used for this analysis. Many families were from culturally and linguistically diverse backgrounds, with 50% of the sample identifying as bilingual. 47% of children had a formal diagnosis of ASD. Multi-modal measurement methods (parent-report and observation) were used to measure ER for parents and children (DERS, ERC). Parenting stress was measured as a latent variable constructed from the Parenting Stress Index and Parenting Daily Hassles, while children’s challenging behaviors were measured using the CBCL. Confirmatory Factor Analysis indicated distinct constructs for different measurement modalities of ER, and thus, were tested separately in models. Thus, parental ER was modelled both as a broad “trait” level construct, as well as ER within the parenting context. Structural Equation Modeling was utilized to test parenting stress as a moderator of the relationship between parent and child ER (Figure 1A), and child ER and parenting stress as mediators of the relationship between parent ER and child behaviors (Figure 1B).

Results: Parenting stress moderated the relationship between parent and child ER ($CFI = 0.96; RMSEA = 0.055$, $SRMR = 0.060$; Figure 2), only for observational data. Hypotheses that parenting stress and/or child ER mediates the relationship between parent ER and children’s challenging behaviors (Figure 1B) were unsupported. Models indicated parenting stress and child ER were strong predictors of children’s challenging behaviors. Exploratory models suggested that child ER mediates the relationship between parenting stress and challenging behaviors.

Conclusions: These results indicate having low to average levels of parenting stress was a protective factor in the transmission of parental emotion dysregulation to children’s dysregulation. This study also showed from a multi-modal perspective, children’s ER capacities are strongly predictive of challenging behavior problems. The results of this study entail implications for both intervention and future research. Interventions which focus on either parenting stress or child ER may prevent the development of behavioral challenges in autistic children. Future research must work to clarify the interaction between parent ER and parenting stress, as well as from a developmental perspective, investigate how child ER mediates the relationship between parenting stress and children’s challenging behaviors.

402.164 (Poster) Examining the Impact of Relationships on Australian Autistic Adults’ Quality of Life: Preliminary Findings
Background: Quality of life (QoL) is an all-encompassing concept capturing an individual’s perception of their situation in life, comprising of physical, psychological, social and environmental factors set within the societal and cultural construct of the individual. People with diverse experiences of disabilities, health conditions and neurotypes can experience high QoL, even though they may objectively have functional challenges.

Relationships are one social factor important for QoL in neurotypical populations. The unique challenges autistic adults experience with social communication could impact their success in developing relationships, particularly with non-autistic individuals. Autistic adults report a strong desire to establish successful relationships, with research demonstrating the psychological impact of negative social experiences such as bullying or a lack of social relationships. Despite this, little exploratory research has been conducted to examine the impact of relationships on autistic QoL.

Objectives: This study sought to explore the impact of relationships on autistic QoL, specifically investigating relationship satisfaction, loneliness and subjective QoL of autistic adults in Australia.

Methods: Data from the Australian Longitudinal Study of Autism in Adulthood collected before the COVID-19 pandemic was utilised for this study. Demographic information (age, gender, marital status), loneliness (University of California, Los Angeles Loneliness Scale- 8 item [UCLS-8]), subjective QoL (World Health Organisation QoL- Bref [WHO-QOL Bref]), autistic traits (Autism Quotient-Short [AQ-S]), and social support satisfaction (Social Support Questionnaire [SSQ]) were collected from 205 autistic adults across Australia. Data were analysed using univariate statistics (Pearson’s and Spearman’s correlations), and four backwards entry multiple linear regression analyses were run to determine factors contributing to each of the four domains of QoL as specified in the WHO-QOL Bref.

Results: Satisfaction with social support was the only variable to appear in all four backward linear regression models and was the largest contributing variable in each model (p<.05, with fewer social supports correlating with poorer QoL across all domains. Loneliness appeared in both the social relationship and psychological domains of QoL and was the second largest contributor to these models (p<.05). Increased loneliness was associated with poorer QoL in the psychological and social-emotional domains. Higher autistic traits were associated with both lower physical health and psychological domain scores of QoL (p<.05). Age was associated with lower psychological QoL scores (p<.05). Gender only contributed to the social relationship model (p<.05). Marital status did not appear in any of the models.

Conclusions: The findings of this study demonstrate that social relationships influence all domains of autistic QoL, with loneliness being additionally associated with poorer psychological and social relationship QoL for autistic adults. Marital status did not influence autistic QoL, but the quality of marital relationships was not assessed. Our findings suggest that other types of relationships may influence autistic QoL. Future research should investigate the influence of different relationships, such as friendships, as well as the quality of marital relationships on autistic QoL.
Objectives: To qualitatively explore factors that contribute to autistic adults’ QoL from autistic perspectives.

Methods: This study utilised a qualitative semi-structured interview method to capture the experiences of autistic QoL. Guided by a co-production approach, two autistic researchers and a steering group of five autistic adults were involved in developing the methodology and the interview guide; 29 autistic adults aged 18 – 55 who lived in Australia were interviewed. All interviews were transcribed verbatim and thematically analysed by the lead author (RK). Excerpts from the first two interviews were shown to the steering group (trained in thematic analysis), who reviewed the coding structure prior to analysis of the additional transcripts. The steering group then met to refine the codes into themes. Similarities between the themes and the International Classification of Functioning Disability and Health (ICF) were identified. Therefore, some results are presented according to level two ICF codes (table 1).

Results: Co-produced thematic analysis identified four themes (Table 1). Activities and participation comprised six subthemes summing meaningful activities and the routines autistic adults constructed around these. Many of the activities within these subthemes enhance autistic QoL when autistic adults can engage in them. Mind and body refer to aspects of the individual and consist of five subthemes. Participants described aspects of their mental and physical health and the influence of sensory preferences on their QoL, with many interconnected factors having a compounding impact on QoL. The environment theme consists of four subthemes, with societal attitudes said to negatively impact autistic QoL and social supports and relationships described as positively influencing QoL when autistic adults had relationships they wished to establish. Finally, the theme of personal experiences encompassed subthemes of self-identity, independence, and strengths. Participants described the profoundly positive impact of understanding themselves on their QoL.

Conclusions: Autistic adults described factors unique to their experience of QoL, including understanding their self-identity, sensory experiences, and the impact of societal attitudes. While other elements appear in non-autistic conceptualisations of QoL, the impact and importance of these factors may vary from non-autistic experiences. Further research should establish how existing QoL measures compare to autistic adults’ conceptualisation of QoL.

402.166 (Poster) Autistic Patients, Caregivers and Staff Experiences of the Acute Hospital Setting: What Are the Gaps? Results from a Scoping Review.
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Background: Due to co-occurring conditions and complex health care needs, autistic individuals make significantly more hospital visits compared to the general population and are 2.1 times more likely to attend the Emergency Department (ED) with longer length of stay and higher associated medical costs. Despite the increasing rate of hospital presentation, autistic patients’ experiences with hospital services have been mixed. While positive experiences about hospital admission have been shared and reported, significant challenges and negative experiences exist that impose barriers and predict care satisfaction. It is critical to understand the unique experiences of autistic patients to improve care and facilitate better hospital experiences.

Objectives: The overall objective of this scoping review was to explore the patient, caregiver, hospital system and staff that affects the experiences of autistic patients in the hospital setting, highlight the gaps in knowledge, and inform future research to support better health outcomes during hospitalisation.

Methods: Using a formal scoping review methodology, a literature search was conducted to include international, peer-reviewed literature about autistic patients and their hospital experiences. Citations were double-screened according to predetermined eligibility criteria, yielding a total of 30 articles.

Results: Autistic patients face several barriers affecting their experiences in healthcare delivery in the hospital setting, as do their families and health staff. Two themes emerged; the first was “barriers that impact negative hospital experiences,” which related to communication (pain, communication difficulties, inconsistent handover), heterogenous presentation (increase fear and agitation), parents and carers (disregard for their expertise, lack of accommodation), and systemic related barriers (minimal staff knowledge, environment, and sensory issues). The second theme was “facilitators that improve hospital experiences,” which included autism care pathways to address individualised needs, collaborative care for parents and expert partnership and systemic support (staff training, ease waiting time and minimising patient transition).
Conclusions: The evidence supports that autistic individuals are susceptible to chronic health conditions alongside lower quality and unmet healthcare needs than others. The findings of this review highlight barriers and facilitators to support autistic patients to adapt to the complexity of hospitalisation. A collaborative, inclusive approach is required to meet the significant challenges overwhelming the autistic patient both in health care access and hospitalisation. Furthermore, the review highlighted the critical need for co-design initiatives to include the lived experience of the autistic community, so that change is created with autistic voices at the forefront.

402.167 (Poster) General Practitioners’ Perspectives Regarding Early Developmental Surveillance for Autism within the Australian Primary Healthcare Setting: A Qualitative Study

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Background: Significant challenges remain in the early identification of developmental disabilities, including autism, in the community. Access to appropriate supports early in the life course has been shown to promote positive developmental outcomes for children at high likelihood of developmental disabilities, including autism.

Objectives: As part of a cluster randomised control trial, this study sought to examine and compare the perspectives and experiences of Australian general practitioners (GPs; family doctors) in primary care clinics using a digital developmental surveillance program for autism with those using the usual care pathway.

Methods: A qualitative research methodology (semi-structured interviews and thematic analysis) was utilised in this study. All GPs from South-Western Sydney (New South Wales; NSW) and metropolitan Melbourne (Victoria) who participated in the main study, “GP Surveillance for Autism” (Barbaro et al., 2021), were invited to be interviewed. GPs who provided consent were interviewed over the phone, online, or in person. Interviews were audio-recorded, transcribed, and coded using NVivo12 software. An inductive interpretive approach was adopted, with data analysed thematically.

Results: A total of 23 GPs across the two sites (NSW: n = 11; Victoria: n = 12) agreed to be interviewed, with data saturation reached following this number of participants. Inductive semantic coding and analysis yielded nine major themes. Common enablers highlighted by participants included the role of GPs in early identification and supports/services, enhanced communication between clinicians/professionals, relationship-building with patients, and access to standardised screening tools. Specific facilitators to the feasibility and acceptability of the digital screening program included having access to specific assessments and resources for the early identification of developmental disabilities, including the early signs of autism, with access to such tools increasing their confidence in conducting developmental surveillance. Those in the digital screening program also highlighted the importance for GPs to participate in further research and education as part of their ongoing fellowship training. Several practical and socio-economic barriers were identified, as were the barriers of limited knowledge and uptake of developmental screening tools. Additional recommendations involved supporting GPs in developmental/paediatrics training, streamlined screening processes, and funding and resources in the primary health care setting. The impact of the COVID-19 pandemic and associated lockdowns was also highlighted. While some participants noted feeling more comfortable with traditional paper-based work than digital interfaces, an unexpected benefit of the COVID-19 pandemic was a shift towards digital systems, delivering greater efficiencies for GPs and families.

Conclusions: The findings from this study provide valuable insights into the perceptions and experiences of Australian GPs regarding the contextual enablers and barriers that impact their participation in developmental surveillance programs and, in particular, the potential and beneficial usage of digital screening tools for developmental surveillance of autism and other developmental disabilities. The study highlighted the need for practice and policy changes, including further training of GPs in developmental disabilities, alongside the provision of sufficient time and public healthcare funding to complete developmental surveillance. Further education is needed on implementation and scale of a national surveillance program for the early identification of developmental disabilities including autism.

402.168 (Poster) Exploring Caregiver Perspectives on Acceptance and Commitment Therapy and Application to Early Intervention for Young Autistic Children

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Background: Caregivers of young autistic children face high levels of stress. With increasing focus on caregiver-mediated early intervention, which requires that caregivers learn and implement skills to address their child’s developmental needs, the stress experienced by caregivers may impact their participation. Currently available mental health interventions, including acceptance and commitment therapy (ACT), target caregiver stress but are not well-studied in caregivers with young autistic children and who are participating in early intervention.
Objectives: To identify caregivers’ perspectives on: i) the benefits and disadvantages of participating in ACT, and ii) the potential application of ACT to those caregivers whose children are participating in early intervention.

Methods: This qualitative study utilized reflexive thematic analysis with a constructivist approach to explore caregivers’ perceptions of ACT. Demographic information was collected and semi-structured interviews were conducted with 8 caregivers from Ontario, Canada. Interviews were coded and themes generated from the codes. Themes were revised based on feedback from the research team and member checking.

Results: Participants included mothers from single or dual parent households with 1-2 autistic children or adults diagnosed before age 5 years who had taken an in-person or virtual ACT workshop between 2012-2020. In exploring the benefits and disadvantages of ACT, the theme changing caregiver’s perspective on prioritizing self/highlights the shift in our participants’ focus to their own needs through accepting and managing their emotions and stress, aligning their actions with their chosen values, and moving towards acceptance of their child. Participants acknowledged feeling supported through establishing a community of other caregivers with whom they could share experiences and process emotions in a psychologically safe environment. Despite practical barriers to accessing ACT, participants noted their experiences in learning ACT were facilitated by their shared philosophies, use of imagery and hands-on activities to reinforce complicated concepts, and participation in a group designed to train ACT facilitators. Participants also shared their views on applying ACT to early intervention, providing their recommendations about accessibility, workshop timing and features, and community support.

Considerations prior to participating in ACT included addressing gaps in messaging around the importance of caregiver mental health and wellness and a caregiver’s readiness to seek wellness support. Participants also maintained the importance of highlighting a child’s strengths and acceptance of the child.

Conclusions: This qualitative study is the first to explore the experiences of caregivers of autistic children with learning and practicing ACT. Themes from this study highlight the internal process whereby caregivers begin shifting their focus on their own mental health needs, as well as the relational aspects of the group that contribute to the feeling of support. Though ACT participants had varying personal experiences with early intervention, their insights into integrating ACT along with early intervention provide a starting point in developing a truly family-centred intervention that honours the reciprocal relationship between child and caregiver.

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**402.169 (Poster) Caregiver Mental Health Needs in Caregiver-Mediated Early Intervention**

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Background: Caregivers of autistic children face high levels of stress and are at risk of developing mental health disorders. Caregivers participating in caregiver-mediated early interventions (CMIs), such as the Social ABCs, where they provide the intervention to their young child, juggle many responsibilities to their child and family, leaving self-care as the last priority. Caregivers may not seek mental health support, though interventions for caregiver stress, such as acceptance and commitment therapy (ACT), exist. This study represents the first step in addressing the gap in mental health supports for caregivers who are participating in CMIs.

Objectives: To understand the mental health needs of caregivers participating in a CMI.

Methods: This study utilized reflexive thematic analysis with a constructivist approach to explore caregivers’ experiences of a CMI, the Social ABCs. Demographic information was collected and semi-structured interviews were conducted with 13 caregivers from the Greater Toronto Area (Ontario, Canada). Interviews were coded and themes were generated from the codes. Themes were revised based on feedback from the research team and member checking.

Results: Demographic data revealed that participants included mothers and fathers from a range of racial/ethnic backgrounds and from mainly dual parent households with 1-2 autistic children. Participants of the Social ABCs verbal and in-person group-based and individual formats from 2018-2021 were included. Four central themes derived from this study illustrate the mental health needs of caregivers participating in the Social ABCs, including: social emotional connection, caregiver wellness tied to child’s success, perceived wellness needs and culturally sensitive care (Figure 1). Given the emotional intensity of caregivers’ experiences early in their journey with their young child, social emotional connection refers to the caregiver’s need to connect with other caregivers or professionals with understanding of their experiences in a psychologically safe environment. In navigating supports for their child and early intervention in particular, caregivers may place an overwhelming focus on building their child’s skills. This emphasis on seeing their child progress directly impacts a caregiver’s own wellness, as illustrated by the theme caregiver wellness tied to child’s success. Despite caregivers acknowledging the importance of their own mental health and well-being or their perceived wellness needs, caregivers may prioritize their own wellness needs below the needs of their child and family. The provision of culturally sensitive care was also highlighted as it poses a barrier to accessing wellness supports for already marginalized caregivers.
Conclusions: This qualitative study is one of the first to explore caregiver wellness and mental health needs in the context of a CMI. Caregivers identify a need for culturally sensitive, psychologically safe formal and informal social supports, which includes mental health support. Given the intense focus caregivers may have on accessing and participating in supports for their child, clinicians should deliver balanced messaging about the importance of the child’s skill development and caregiver mental health and wellness as there may be bidirectional impacts. Future research on CMI should consider ways to address caregiver mental health needs during the intervention to optimize overall family functioning.

Background: Since autism diagnosis is directly linked to the availability of supportive services, identifying best practices for early diagnosis of autism has long been a concern of professionals and families. Meanwhile, studies show persistent racial disparities in autism diagnosis. Although numerous clinical diagnostic guidelines have been published, there is not enough discussion of diagnostic procedures through the lens of culturally diverse families.

Objectives: This study focuses on the autism diagnostic experiences that Korean immigrant mothers had with their children.

Methods: Eleven first-generation Korean-American mothers of children with autism were included in the study. The data was collected using semi-structured interviews in Korean. The interview data were inductively analyzed through a cyclical analysis identifying patterns and themes throughout the interview transcripts. Major categories of codes were developed from the open codes by making connections between category and subcategories. The major categories functioned as informing and illustrating the key factors contributing to the identification process of the children of the participants.

Results: The main five factors (i.e., cultural beliefs and values, language barriers, complex emotions, immigration and navigating systems, and facilitators and assets) that mainly influence the diagnosis process were identified through thematic analysis. Dynamics are interactive within and between the factors, influencing the entire diagnostic process by either delaying or facilitating the identification of a child’s autism and the provision of treatment. The analysis highlighted culture as a crucial factor in the diagnostic process for the participants. There were three areas through which culture influenced participant perception of what disability entails and the stigma of being diagnosed with autism in Korea. These areas included the perception of autism as a severe disorder, word choices reflecting medical model approach to autism, and insufficient awareness about autism as a result of limited historical interactions with individuals with disabilities of the parents themselves. The participants also experienced a language barrier which contributed to the challenges in accessing resources and services for their children and or understanding the extent of their child’s needs. More, participants received inconsistent recommendations regarding using the native language versus English. However, regardless of the recommendations received, all participants reported speaking only English in the home.

Conclusions: Findings from this study imply that there are several barriers for toddlers with autism to receive a formal diagnosis in Korea. For instance, participants who attempted to pursue evaluation in Korea struggled to receive a diagnosis despite recognizing their child’s early signs of autism. It was reported by participants that the heightened threshold for diagnostic criteria was one of the barriers in timely identification in Korea. Additionally, mothers were told that clinicians were unable to provide a formal diagnosis of autism for children under three. As previous literature suggests that the prevalence of autism in Korea will increase as more accurate diagnoses are made and awareness of the autism spectrum increases (Kim et al., 2011), future studies must examine the extent to which these factors contribute to the discrepancy between the actual prevalence of autism and the identified diagnosis.

Background: Participation in leisure activities for children with Autism Spectrum Disorder (ASD) is important in supporting their psychological well-being and peer relationships, enabling exploration of their interests and enjoyment. While previous research has shown that participation in leisure activities can significantly improve the well-being of children with ASD, there is a need for more research on the specific factors that influence and facilitate participation in these activities.
examined the differences in the participation of adolescents with ASD and their peers in leisure activities, little is known regarding the levels of interest and participation for younger children with ASD and the barriers and facilitators of their participation.

Objectives: To compare the interest and participation in leisure activities between children with ASD aged 4 to 12 years and their neurotypical developing (TD) peers and identify the barriers and facilitators to participating in leisure activities for children with ASD from caregivers’ perspectives.

Methods: A cross-sectional online survey using a modified version of the Pediatric Interest Profiles (PIP) (Henry, 2000) to capture the interest and participation profiles of children with and without ASD. The leisure domain covered eight categories including club, creative, exercise, intellectual, outdoor, relaxation, socialising and sports across 100 items. Caregivers of children with and without ASD completed the PIP together with their child. Open-ended questions followed each domain for caregivers to provide further details on the barriers and facilitators to participating in each category. The Mann-Whitney U test was used to compare the two sample scores. Directed content analysis was used to analyse the barriers and facilitators of leisure activity participation based on the framework developed by King et al. (2009). A total of 38 children (17 with ASD, 21 without ASD) aged between 4 – 12 years (53% female) participated. All sixteen caregivers of children with ASD were parents (95% mother).

Results: We found great similarity among the activity categories in which both children with ASD and their TD peers were interested and participated in. Both groups were interested in creative, outdoor, socialising and relaxation activities. However, children without ASD showed a significantly higher level of interest in the categories of creative ($p=0.002$, $r=0.5$), exercise ($p=0.002$, $r=0.5$), outdoor ($P<0.001$, $r=0.6$) and socialising ($p=0.006$, $r=0.4$). The most engaged activities by both groups were in the areas of creative, intellectual, relaxation, and outdoor. Similarly, children without ASD showed a significantly higher level of participation in the categories of creative ($p=0.009$, $r=0.4$), exercise ($p=0.034$, $r=0.3$), outdoor ($p=0.002$, $r=0.5$) and socialising ($p=0.002$, $r=0.5$).

The barriers and facilitators of leisure activities were grouped under environmental factors, family factors and child factors. Environmental factors included the attitudes of society, physical environment, programs and activities, system and policy, informational support, and supportive relationships for the child. Family factors comprised financial, time impact on family and supportive home environment. Child factors included child’s emotional, behavioural and social function, child’s physical, cognitive and communication function, child’s perception own athletic and scholastic competence and child’s preferences.

Conclusions: While children with ASD show interest in a range of activities including outdoor and social activities, however, their participation rate is significantly lower than their TD peers. Understanding the barriers and facilitators to participation could help improve their participation and bridge the gap for children with ASD.

423.146 (Poster) Lessons of Remote Learning: Perspectives of Parents of Students with Special Education Needs

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Background: The pandemic halted in-person teaching for most school-aged children, bringing rise to remote learning globally. The full impact of this disruption to education is not fully known, especially among students in special education, though early research indicates negative impacts on services and mental health (Rosencrans et al., 2021). There is a small body of evidence indicating some benefits to remote learning, especially among autistic students (Reicher, 2020).

Objectives:

The current study aims to better understand the parent experience of remote learning for children with special education needs. With half of this sample representing autistic students, this is of particular interest.

Methods:

Participants were from the Parent Experience of Remote Learning Study (PERLS), a longitudinal study funded by the National Institute on Minority Health and Health Disparities that surveyed parents of school-aged children in Southern California, once a month for six months starting in March 2021. At timepoint one, respondents were asked what would have made at-home schooling more effective for their child with special needs. 281 respondents reported having at least one child who received special education services, with 43.2% qualifying under the eligibility of autism. Among these participants, 61.6% (n=173) responded to this optional, open-ended question. Responses of ‘no’ or ‘n/a’ were excluded from qualitative analysis (n = 28), leaving 145 codable responses to be analyzed using thematic analysis. Three responses were double-coded, yielding a sample of responses 148. A team developed a codebook of common themes; responses were coded with 75% agreement.

Results:
Results of the thematic analysis are shown in Figure 1. 10.14% of respondents reaffirmed their satisfaction with remote learning. 24.32% of the responses were related to themes that centered around socialization or relationships. These themes included Relationship with Teacher, Socialization Opportunities with Peers, and Social Support; the most common theme was Relationship with Teacher (13.5%). 6.8% of responses indicated a desire for more socialization with peers, and 4.1% of parents desired social support for themselves. Quantitative analysis revealed that these participants reported overall satisfaction with their child’s current schooling, with 79.0% indicating being at least somewhat satisfied that school year, and 83.6% reported satisfaction with the delivery of their child’s special education services. When asked how often they were concerned about their child’s social development, 80.7% of respondents indicated that they were concerned at least half the time.

Conclusions: The current study demonstrated that the sample were overall satisfied with remote learning, with some expressing preference for this method of teaching. Though parents were satisfied with their child’s schooling, they expressed concern over their child’s social development. In fact, qualitative analysis revealed that a common support parents desired was related to building relationships with peers and the teacher. Students who choose to remain in remote learning may benefit from supports related to building relationships with teachers and peers, especially autistic students in remote learning who are already prone to poorer student-teacher relationships than their non-autistic peers (Caplan et al., 2016).

423.147 (Poster) Life Experiences of Siblings of Autistic Individuals in a Low Resource Country: Impact of a Peer Support Group
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Background: Having a person with autism can be challenging for all family members, including typically developing siblings of the autistic individual. While seeking support and services for the person on the spectrum, Parents usually interact with other parents, and thereby form a support system. However, for siblings, the experience of living with a brother or a sister with autism can feel ‘alone’, as it is common for siblings to be left behind. Siblings spend most of their life resenting their sibling, without understanding the implications of having an autistic sibling. In a country like India, where there is no state support, typically developing siblings are an answer to most parent’s ‘what after us’ question. This unspoken daunting cultural expectation often leaves typical sibling with many unanswered questions. The present study seeks to understand experiences of siblings of individuals with autism, and also study impact of peer-support programme based on an American model Sibshops on sibling relationships.

Objectives: This study aimed at understanding needs of typically developing siblings, including their feelings, emotions, adjustment and coping. It further aimed at exploring impact of peer support programme on feelings, emotions and relationship of typically developing siblings of autistic individuals.

Methods: Nine typically developing siblings participated in peer-support programme at an autism organisation in New Delhi, India. A safe place for siblings to share their feelings with other participants, twelve 3-4 hours long sessions were conducted over four months. The sibling support model Sibshops was adapted for the Indian culture and was a mix of fun and discussion activities focussing on peer support. The programme was a safe place for siblings to share their feelings with other sibling participants. The typically developing siblings and their parents were interviewed at the beginning and at the end of the programme. In addition, activities of the peer-support programmes were designed to capture different emotions and feelings towards the typically developing siblings. These discussion activities as well as the pre and post interviews were audio recorded and transcribed. Qualitative analysis using grounded theory was utilised to understand various emotions, feelings and to understand the relationship of typically developing children with their brother or sisters with autism.

Results: Findings from sibling measures indicated increase in knowledge of autism; decrease in anger/resentful feelings towards autistic siblings; use of more positive coping styles; decreased emotional, conduct, and peer problems of typically developing siblings. Parents reported decreased negative behaviours towards autistic siblings, and improved relationship.

Conclusions: This is one of the first studies in a low resource country like India studying typically developing siblings of autistic individuals, which also tries to study impact of providing peer-support. Results support need for group interventions and evaluation to improve mental health functioning of this group. Study has implications for running sibling support groups in LMIC.

423.148 (Poster) Maternal Early Deleterious Conditions Shape the HPA Axis of Her Future Offspring: A Nonhuman Primate Model of Intergenerational Stress Transmission
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Background: Children are born with a limited capacity to regulate their own emotional state. A sensitive caregiver promotes infant development of self-regulation over time by coregulating their infant’s arousal. Identifying factors that influence a caregiver’s capacity to sensitively coregulate with their infant is important for supporting caregivers in their role. Certain early life events associated with chronic
dysregulation of the stress response impact hypothalamic-pituitary-adrenal (HPA) axis development and behavioral outcomes. Nonhuman primates studies show that rearing in the absence of a mother leads to dysregulated HPA axis functioning over the lifespan. The impact of this dysregulation on future caregiving behaviors and future offspring outcomes is unclear, particularly as they relate to infant arousal regulation.

Objectives: We examine the consequences of deleterious early conditions on maternal HPA axis functioning and caregiving behaviors, as well as their impact on the HPA axis development of future offspring.

Methods: 569 rhesus monkeys, including 276 mother-infant dyads, were followed from infancy to adulthood. Mothers were reared in one of three conditions: 1) mother-reared (MR) in normative conditions, 2) peer-reared (PR) without mothers but in the constant presence of same-age peers, or 3) surrogate-peer-reared (SPR) without mothers and with limited daily contact with same-age peers. Stress-induced plasma cortisol and adrenocorticotropic hormone (ACTH) were collected from mothers on six occasions, from day-14 to day-180 of life. Those females that eventually became mothers themselves reared their own offspring in normative, MR conditions. Stress-induced cortisol and ACTH concentrations were collected from offspring on six occasions, from day-14 to day-180 of life. Maternal caregiving behaviors were recorded twice-weekly from birth until day-180 of offspring life. We examined associations between maternal early rearing conditions and: 1) maternal stress-induced ACTH and cortisol concentrations in her own infancy, 2) maternal caregiving behaviors, and 3) offspring stress-induced ACTH and cortisol concentrations.

Results: Results showed that stress-induced plasma ACTH and cortisol concentrations were blunted among PR and SPR subjects, particularly during the first 90 days of life. During stress-inducing conditions, offspring raised by PR or SPR mothers exhibited blunted ACTH and cortisol levels over the first 180 days of life, while those reared by MR mothers showed elevated ACTH and cortisol concentrations (see Figure 1). The caregiving behavior of PR and SPR mothers was characterized by high rates of infant rejection, particularly in the first 30 days of life.

Conclusions: These results suggest that offspring HPA axis functioning is shaped by their mothers’ own early experiences, and that these effects may result, in part, from maternal difficulties in regulating their own arousal. A study exploring factors that may alleviate the relationship between maternal adverse childhood experiences and offspring socioemotional outcomes is underway in humans. To the extent that these results generalize to humans, they suggest that caregivers come into their role with their own life histories and experiences, which may impact offspring socioemotional outcomes. While infants play a role in dyadic caregiver-infant interaction, these findings suggest that enhancing a caregiver’s capacity to coregulate their infant’s arousal is an important target for promoting healthy socioemotional outcomes.

423.149 (Poster) Maternal Health Habits and Observed Parenting in Mothers of Preschool Children with Autism Spectrum Disorder

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Background: Mothers of children with Autism Spectrum Disorder (ASD) report high levels of stress, depression, marital strain, and divorce, with little time to devote to their own health (e.g., sleep, diet) due to the high demands of their child’s care. Despite their well-documented high levels of stress and the relationship of stress to negative parenting, there are few observational studies of parenting in this population and few on health habits impact on quality of parenting. Health habits are modifiable and experimentally related to reduced stress and better health and functioning. There is a need to identify areas of possible intervention to better support parents of this population.

Objectives: This study examined parents health habits (e.g., sleep, exercise, diet) which have a known relationship to overall wellbeing. The purpose of this study was to investigate whether these habits demonstrated a relationship to observed parenting behaviors of mothers of children with ASD.

Methods: Participants were 42 mother-child dyads, with children ages 2-6 to 5-6 recruited from a preschool utilizing an Applied Behavior Analysis (ABA) approach to schooling. All children had a clinical diagnosis of autism that was confirmed with the Autism Diagnostic Observation System – Two (Lord, Rutter, DiLavore, Risi, Gotham, & Bishop, 2012). Parenting behaviors were observed across three tasks designed to mirror naturalistic mother-child interactions, which were videotaped for later coding using the Psychological Multifactor Scale – ASD Adapted Preschool Version (Brassard, Donnelly, Hart, & Johnson, 2016). Mothers completed questionnaires on parental stress, maternal depressive symptoms, and health habits. Parental stress was measured with the Parenting Stress Index – Fourth Edition, Short Form (Abidin, 2012). Depressive symptoms were measured through the Patient Health Questionnaire-9 (Kroenke, Spitzer, & Williams, 2001). Health habit questions were adapted through the Promise Neighborhoods RFA Indicators and the Promise Neighborhoods Research Consortium [PNRC] Measurement System: Promise Neighborhoods Research Consortium: Measures, 2001).

Results: More than half of the mothers demonstrated sufficient sleep, eating habits varied significantly in quality, exercise was infrequent, and most mothers did not smoke and had not been asked to lose weight. Observed parenting behaviors were found to be skewed with most
Mothers using high levels of positive parenting behaviors and low levels of harsh parenting behaviors. Those who did engage in negative parenting reported higher levels of stress.

Health habits were significantly related to quality of parenting for both positive and harsh parenting in a serial multiple mediation model. Higher levels of health habits related to lower levels of maternal depressive symptoms, which related to lower levels of parental stress, which related to more instances of positive parenting (r=.64) and fewer instances of harsh parenting (r=.24).

Conclusions: Mothers in this sample reported higher levels of stress and maternal depressive symptoms compared to normative samples, consistent with the literature on parents of children with ASD. Promoting good health habits in mothers of children with ASD should be explored as an intervention for reducing stress and depression and improving quality of parenting.

423.150 (Poster) Maternal Mental Health and Early Child Cognition in Infants at Elevated Risk for Autism

Background: Research suggests that autism risk is conferred by a gene x environment interaction, weighted higher on the side of environment (Bolte, Girdler, & Marschik, 2019). One suggested form of environmental influence is maternal mental health. Mothers with depression and anxiety experience stress during and after pregnancy, which leads to perinatal environmental differences that influence development (Karimi et al., 2017; Gudsnuck & Champagne, 2012). In the general population, parental depression and anxiety has been shown to have an impact on early child cognition (Glover, 2014). Past research suggests infants at elevated-risk for ASD at 6 months have lower visual reception (VR) skills compared to typical-risk infants (Estes et al., 2015).

Objectives: This project aims to understand how maternal mental health relates to child early cognitive functioning in infants at elevated-risk or typical-risk for autism outcomes. We first examine visual reception as a domain of cognitive skill in 6-month old infants in elevated-risk vs typical-risk infants. We then examine if maternal mental health scores are related to early child cognition and if this relationship differs for the elevated-risk mother-infant dyads vs the typical-risk mother-infant dyads. We will also explore, in our longitudinal design, relationships between child cognition at 6 and 12 months and maternal mental health.

Methods: Data from 102 participants in the Washington Study of Outcomes, Neural Development and Early Risk (WONDER) was used in the analysis. Participants included families with children who are divided into three groups for analysis: (1) Elevated-Risk-Familial (ER-F) (n=65, 50.8% Male) with at least one incidence of autism in the direct family; (2) Elevated-Risk-Low Birth Weight (ER-LBW) (n=27, 55.6% Male) were infants born with low-birth weight but no familial history of ASD; (3) Typical-Risk (TR) (n=10, 40% Male) were infants with no familial history of ASD. Mental health was assessed using the Beck Anxiety Inventory (BAI) and Beck Depression Inventory (BDI). Self report was included from the biological maternal caregiver (individuals epigenetically related and involved in gestation). Mullen Scale of Early Learning (MSEL) was used to assess child VR scores across two time points (6 and 12 months).

Results: Preliminary analysis shows no significant differences between groups for VR at 6 months (F=0.307, p=.736). One-way ANOVA was run to compare depression and anxiety total scores by group. A significant main effect of group existed for anxiety (F=4.846, p=.01) but not depression (F=2.703, p=.072); mothers in TR (M=11.25, SD=3.56) compared to ER-F (M=4.48, SD=4.27) and ER-LBW (M=5.15, SD=5.47) reported higher anxiety. Bivariate correlation found no significant correlation between VR scores at 6 months and maternal mental health. Future analyses at 12 months will be conducted for presentation.

Conclusions: In our preliminary analyses, no significant difference was found in VR skills at 6 months between groups at elevated-risk and typical-risk for ASD. While maternal anxiety was increased in TR compared to ER-LBW and ER-F at 6 months, there was no relation between maternal mental health and child cognition.

423.151 (Poster) Measurement Invariance of the Promis Emotional Distress and Subjective Well-Being Domains Among Autistic and General Population Adolescents

Background: Quality of life (QoL) is a high priority for autism research, but psychometric validation of QoL measures in autistic populations is lacking. To accurately measure autistic QoL with a scale developed on the general population, researchers must confirm it functions similarly for autistic people.
**Objectives:** Determine whether scales within the Emotional Distress and Subjective Well-Being domains of the Patient-Reported Outcomes Measurement Information System (PROMIS) demonstrate measurement invariance across autistic and general population teenagers (14-17 years).

**Methods:** We evaluated the pediatric self-report forms of the Emotional Distress (Anger, Anxiety, Depression, and Psychological Stress) and Subjective Well-Being (Life Satisfaction, Meaning & Purpose, and Positive Affect) domains of the PROMIS. We conducted secondary confirmatory factor analyses (CFAs) on data from 140 autistic and 1,627 general population adolescents. We fit CFA models to the baseline PROMIS model for each group independently, then combined data across groups to establish configural invariance. Next, we evaluated metric invariance by constraining factor loadings to be equivalent across groups, with freely varying intercepts, and compared fit to the configural models. This analysis tested whether the pattern of item loadings is equivalent across groups. Third, we evaluated scalar invariance by constraining factor loadings and item intercepts to be equivalent across groups and compared fit to the metric models. This analysis tested whether equivalent scores on the scales imply equal levels of the construct in autistic and non-autistic teens.

**Results:** Invariance was determined based on nonsignificant chi-square difference tests (p values > .05) and minimal deterioration in model fit (ΔCFI values < -.002). Within the Emotional Distress domain, only Depression demonstrated full scalar invariance across groups. Anger and Psychological Stress met criteria for configural and metric invariance, but not scalar, as model fit deteriorated between metric and scalar invariance. Anxiety did not demonstrate metric or scalar invariance. Within the Subjective Well-Being domain, only Positive Affect demonstrated full scalar invariance across groups, although notably the base model fit for Positive Affect was marginal (CFI = .87). Life Satisfaction and Meaning & Purpose scales did not meet criteria for metric or scalar invariance (see Table for results).

**Conclusions:** PROMIS scales demonstrated varying degrees of measurement invariance across groups of autistic and general population adolescents. Because Depression and Positive Affect demonstrated scalar invariance, scores can be meaningfully compared across groups. Anger and Psychological Stress demonstrated metric, but not scalar, invariance, indicating that while variables are measuring the same latent construct, comparing group means is not psychometrically supported. However, scores on these scales can be validly used to measure these constructs within the autistic population. Anxiety, Life Satisfaction, and Meaning & Purpose did not meet criteria for metric or scalar invariance, indicating that they may function differently for autistic and general population adolescents, and scores for autistic and non-autistic individuals may not indicate comparable levels of the construct being measured. Our findings provide guidance about which PROMIS scales can be used to compare across autistic and general population teens or within an autistic sample only, and which are not psychometrically supported for autism research.

**Background:** Wellbeing is the measure of a person’s overall happiness, satisfaction with life, and positive outlook on life. Wellbeing of autistic people and their families is an important construct to understand, particularly in the realm of therapies meant to assist in improving the person’s life. While there are therapeutic methods believed to improve wellbeing or a person’s overall life, clinicians in behavioral health treatment often solely focus on areas such as goal attainment and miss out on the bigger picture - are the therapeutic methods improving a person’s wellbeing? In 2021, a large behavioral health organization set out to understand the wellbeing of their over 11,000 participants. To do this, these authors set out to find a wellbeing scale which would measure accurately an autistic person’s wellbeing, as well as the wellbeing of their family. After months of research into existing wellbeing scales, these authors determined it was necessary to create a wellbeing scale with an emic approach for the autistic population and their families due to challenges of finding a wellbeing scale which met certain criteria such as being shorter than 20 questions and was specific to the autistic population.

**Objectives:** To create a wellbeing scale for families with an autistic child with good validity and reliability. Additionally, it was important for these authors to create a scale with less than 20 questions due to the challenges in the completion rate of longer scales the behavioral health organization has historically experienced.

**Methods:** To do this, the authors began to research factors contributing to wellbeing and then created questions based on what was determined to be the top three factors. From there, the authors received stakeholder feedback from autistic youth, autistic adults, and families with autistic children and made necessary changes based on their feedback. Once all necessary updates were made, a sample population of 809 families of autistic children took the family version of the wellbeing scale in order to determine the psychometric properties of the scale.

**Results:** The three factors incorporated into the family wellbeing scale were family self-determination, family relationships, and family management. Factor analysis of the 809 respondents resulted in a three-factor scale with a very good alpha coefficient of 0.88, demonstrating the scale to have strong reliability.

**423.152 (Poster) Measuring the Wellbeing of Autistic People and Their Families: Looking Beyond Goal Attainment in Behavioral Health Treatment**

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Conclusions: It is vital for organizations serving a particular population in the realm of intervention to measure meaningful progress and change. Wellbeing is an important construct to understand in the life of the family of an autistic child due to the additional burden of care for the family, additional time for intervention, and the additional cost associated with having a family member with a developmental disability. The family wellbeing scale allows for an understanding of overall family wellbeing, has a good response rate, and also has strong reliability, thus allowing for any organization to understand how their client’s and their families are being impacted by their respective therapies, services, and interventions.

423.153 (Poster) Mothers' Postpartum Mental Health: The Early Environments of Infants at Elevated Likelihood of Autism
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Background: Postpartum depression and parenting stress have been shown to be associated with adverse child social-emotional, cognitive, and linguistic outcomes outside the context of autism. Studies commonly show elevated rates of depression and stress among caregivers of children with autism, beginning at the youngest ages when autism is typically diagnosed. Given the importance of depression and stress in the postpartum based on general population samples, it is essential to better understand depression and parenting stress over the course of the early months of infancy in mothers of infants at elevated likelihood (EL) of autism due to familial history.

Objectives: We aimed to compare levels of depression and parenting stress between mothers with EL infants and mothers with no family history of autism (typical likelihood of autism; TL), in the first six months following birth.

Methods: Participating mothers completed the Edinburgh Postnatal Depression Scale (EPDS), a validated self-report screening measure for postpartum depression (Total: n = 103; EL: n = 43) and the Parenting Stress Index-Short Form, a self-report measure of parenting related stressors including sub-scales of parental distress, parent-child dysfunctional interaction, and perceptions of child difficulty (Total: n =151; EL: n = 58) at 1, 3, and 6 months postpartum. A score of 10 or greater on the EPDS indicates clinically significant levels of depression. Multilevel models were used to assess the association between autism likelihood and infant age on mothers’ depression symptom severity and parenting related stress.

Results: Significantly more mothers in the EL sample had clinically elevated levels of depression symptoms in the first six months postpartum (20.9%) compared to the TL sample (8.3%). Autism likelihood status had a main effect on mothers’ depression symptom severity ($F(1, 218) = 4.23$, $p < 0.05$) and parenting stress ($F(1, 300) = 6.94$, $p < 0.01$) with no effect of age or interaction between age and autism likelihood status.

Conclusions: Adding to the literature on parents of older children with autism, we found that mothers of EL infants, within the first six months of life, endorse greater symptoms of postpartum depression and higher levels of parenting related stress than mothers of TL infants. Further, our finding that 21% of mothers of EL infants had clinically significant levels of depression symptoms adds meaningful new information in relation to previous studies’ findings that rates of postpartum depression are roughly 13% in community samples. Given the goal of longitudinal sibling studies is often to explore the earliest development of children at elevated likelihood of autism and the important role stress and depression can play in influencing child trajectories, future studies should analyze the role of maternal mental health in shaping child outcomes. Ongoing analyses will explore longitudinal interactions between postpartum depression and stress levels and the possible impact of depression and stress on EL children’s developing social attention and communication skills.

423.154 (Poster) My Emotions and Me: A Coproduced Study on Emotion Responses with Autistic Young People to Inform the Development of Future Emotion Responses Measurement
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Background: Neurodivergent young people are particularly at risk for mental health conditions, yet traditional models of translational mental health research often rely on concepts defined by and for non-neurodivergent adults. This study is part of a wider programme, Regulating Emotions–Strengthening Adolescent Resilience (RE-STAR), which places the voices of young neurodivergent people at its heart, through the use of a co-intentional translational model of mental health research.

Objectives:

In this study, we aim to understand how neurodivergent young people with a diagnosis of autism, adhd or both experience and manage their emotions.
1. What triggers strong emotion reactions for young people? (e.g., what types of situations)

2. How do young people experience those emotions? What does it feel like? How do they describe these feelings?

3. How do young people regulate these emotions? How do they manage these feelings? What helps them get their emotions under control?

Themes from the qualitative interviews will feed into the development of a new self-report measure of Emotion Responses in Neurodiversity (ERNI)

Methods:

10 young neurodivergent adults (aged 18 – 25 years) were recruited to form RE-STAR’s Youth Researcher Panel. The panel worked with RE-STAR researchers to co-produce an interview schedule, creative tasks, and vignettes which were then administered to a sample of 57 young people (aged 11-15 years-old) with a diagnosis of autism and/or ADHD. The interviews were recorded and transcribed, and reflexive thematic analysis was employed to answer the research questions above

Results:

In this presentation we will report on rich data from 21 autistic young people aged 11-15 years old. Results will include the following themes i) The stresses and strife of everyday life (stressors/triggers/challenges) ii) Expressing vs camouflaging emotions iii) Perceived barriers to recovery from emotional outburst iv) reducing chances of distress iv) Tolerating big emotions.

Conclusions:

RE-STAR, through its co-intentional approach to translational science, combines science-based approaches with neuro-divergent perspectives to inform the development of future mental health support, tailored to the needs of neuro-divergent young people. Methodological strengths of the approached presented are intended to offer novel, inclusive and reflective tools for mental health research with (not on) neuro-divergent young people. Importantly, results shed light to how autistic teenagers think and talk about their emotion regulation and coping strategies. Challenges, limitations and future research steps will be considered.

423.155 (Poster) Older Sibling Impact on Clinician- and Parent-Reported Autism Features from Toddlerhood through Early Adulthood

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Background: Siblings impact multiple aspects of autistic individuals’ development from childhood through early adulthood (Rosen et al., 2022). While having an older sibling, in particular, has been associated with fewer challenges in social communication (SC) at a single timepoint in toddlerhood (Ben-Itzchak et al., 2016) and earlier age of autism diagnosis (Mishaal et al., 2014), it is unclear how having an older sibling may influence core autistic domains across time. Additionally, given that autistic females may present with autism differently than males (Chellew et al., 2022), there may be differential effects of older siblings on autism features over time based on gender.

Objectives: This study aimed to 1) examine differences in SC and restricted/repetitive behaviors (RRBs) between autistic individuals with and without older siblings from toddlerhood through early adulthood, 2) test gender as a moderator of these effects, and 3) account for clinician observation when examining sibling effects on parent-interviewed SC and RRBs.

Methods: This study involved 253 individuals with autism spectrum disorder or non-spectrum developmental delays followed longitudinally from ages 2-18. Autism symptoms (SC and RRBs) were captured at 5 timepoints using the Autism Diagnostic Observation Schedule (ADOS) and Autism Diagnostic Interview–Revised (ADI-R). Participants were administered standardized intelligence quotient (IQ) measures to assess verbal IQ (VIQ). A series of regression analyses were run using sibling variables as predictors (dummy coded with “has older sibling/s” as a reference group) and each interaction with gender (controlling for VIQ) to assess the effect of older siblings for males and females on autism features at each timepoint. Models predicting ADI-R were re-run with ADOS as a covariate.

Results: Findings revealed that the impact of having older siblings on autism features was most prominent early in life (ages 2-5), with more effects on SC than RRBs, according to both clinician observation and parent interview.

Although there were initially no main effects of older siblings on SC (ADOS or ADI-R), differences emerged on parent-reported ADI-R-SC after accounting for clinician observation. Autistic individuals with older siblings were reported to have more SC challenges than individuals with only younger siblings at ages 2 ($B=-2.20, p<.05$) and 3 ($B=-3.03, p=.004$).
Additionally, gender emerged as a significant moderator of the effect of older siblings such that female autistic children with older siblings demonstrated fewer autism features than those with only younger siblings (age 2: $B=2.734$, $p=.02$; age 3: $B=8.19$, $p=.02$; age 5: $B=4.45$, $p=.006$; age 18: $B=5.142$, $p=.015$; Figure 1), while the opposite was true for males. Interactions replicated across ADOS and ADI-R.

Conclusions: Overall, the effect of older siblings on autism features was complex. Parents who have older children to reference development for their autistic children may be more sensitive to atypicalities or may even overreport SC symptoms, particularly for male children in early childhood. Female children, however, may benefit from having older siblings with/from whom to practice social skills and model behavior. Clinicians should consider these effects when assessing for autism in early childhood and may wish to leverage the effects of older siblings for autistic females.

423.156 (Poster) Parent Couple Experiences in the Context of Broad Autism Phenotype

Background: The quality of parent-couple relationships is a robust predictor of adult physical and psychological well-being (Carr & Springer, 2010). Specific traits (e.g., neuroticism) and conditions (e.g., depression) have long been associated with difficulties establishing and maintaining romantic relationships. Broad autism phenotype (BAP) traits are also linked to couple outcomes such higher levels of conflict (Hartley et al., 2019) and lower levels of relationship satisfaction (Pruitt et al., 2018).

Objectives: The current study examined the association between parent-couples’ individual level of BAP traits (actor and partner) on parent-couples use of positive and negative dyadic coping in couples parenting a child with ASD and those with children with no known developmental disability using the Broader Autism Phenotype Questionnaire (BAPQ; Hurley et al., 2007) and the Dyadic Coping Inventory (DCI; Bodenmann, 2005).

Methods: This study draws upon time-1 of an ongoing longitudinal study which includes 184 couples parenting a child with ASD and 183 couples parenting a child without neurodevelopmental disabilities. Parent-couples completed questionnaires separately during a two-hour lab or home visit. BAP was examined as a continuous and dichotomous variable. A one-way multivariate analysis of covariance (MANCOVA) was used to examine the subdomains of BAPQ (Hurley et al., 2007) (aloofness, pragmatic language deficits, and rigidity) across parent-couple groups. Multilevel models were conducted to test Actor-Partner Interdependence Models (APIM).

Results: MANCOVA results indicated significant group differences in BAP subscale traits and BAP total scores with parents of children with ASD reporting higher levels of BAP traits than parents of neurotypical children. In our sample, 20% of mothers and 21% of fathers in the ASD group had BAP when using the BAPQ cut-offs in comparison to 16% of mothers and 8% of fathers in the comparison group. APIM findings evidenced an actor effect of rigidity on positive and negative dyadic coping. Additionally, mothers evidenced higher negative dyadic coping when their partner (fathers) evidenced a higher (versus lower) level of aloofness.

Conclusions: Overall, findings suggest that mothers and fathers are impacted by BAP traits within the parent-couple relationship. Specifically, our findings suggest BAP traits may impact positive dyadic coping by inhibiting communication through deficits in partner perspective taking and empathetic response in both ASD and non-ASD parent-couples. Implications for these findings include the development of targeted interventions aimed at recognizing and managing the negative effects of elevated rigidity and aloofness on couple-level processes and the enhancement of engagement and empathy in couples’ communication.

423.157 (Poster) Parent Perspectives on Early Intervention for Children with a High Likelihood for Autism
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Background: There is a high prevalence of hearing loss in autistic children (Kancherla et al., 2013). Toddler siblings of children with autism have a higher likelihood for developmental delays, beyond an autism diagnosis, but it is not yet understood if the risk of hearing loss extends to siblings. Currently, there are few studies that focus on parent concerns of infants/toddlers that have an older sibling with autism and no known studies that focus on sibling hearing loss. Parent self-efficacy impacts family outcomes of children with autism because self-efficacy contributes to the parent’s perception of their own competence to fulfill their role of parenting in a successful way (Russell & Ingersoll, 2021). It is essential to know these specific concerns, regarding concerns about overall development, hearing, and intervention, to proactively help with planning of interventions (Hampton & Rodriguez, 2021). The purpose of the study is to understand the relationship between parenting self-efficacy scores and different levels of parent concern over their child’s hearing, communication development, and attitudes toward preemptive intervention.

Objectives: (a) How concerned are parents regarding infant/toddler’s sibling development? (b) How concerned are parents regarding their infant/toddler’s hearing status and do parents report a higher rate of hearing loss in infant/toddler siblings? (c) How willing are parents to seek out intervention services for infant/toddler siblings? (d) How do parent concerns correlate with their parenting self-efficacy?
Methods: 139 Parents of children (11-60 months of age) diagnosed with autism completed an online survey. Parents were asked demographic questions, yes/no questions regarding concern for their child’s hearing loss and development, and questions about beliefs in regard to intervention and monitoring developmental milestones. Parents were also asked to complete the Early Intervention Parenting Self-Efficacy Scale (EIPSES). The EIPSES was utilized as part of the survey to understand the parent’s perception of themselves and to understand their overall beliefs in their parenting (Guimond et al., 2008).

Results: Over 20% of parents reported their infant/toddler having hearing loss and over 35% reported passing their newborn screening hearing test but having hearing concerns afterwards. Results also indicated that parenting self-efficacy correlates with the parent’s concern level, showing that parents who have concern of their infant/toddler’s development, also have a higher self-efficacy score compared to those who do not have concern (t=2.549, p<0.05). Additionally, results indicated that parents will have higher concern of their infant/toddler if their older autistic child has more severe autism symptoms (OR=1.74, SE=0.39). Results also indicated that, regardless of the parent self-efficacy scores, parents will still be interested in participating in preemptive interventions (β=0.078, SE=0.12, p=0.46).

Conclusions: It is recommended that practitioners/researchers help facilitate accessible intervention opportunities for parents of children with autism who have an infant/toddler sibling. Results will also be discussed with interpretation from an autistic community board, which includes self-advocates, parents of autistic children, and siblings of autistic people.

423.158 (Poster) Parent Support Following an Initial Autism Diagnosis; A Mixed Methods Pilot Study of "Autism 101"
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Background: Following an initial autism spectrum disorder (ASD) diagnosis, parents of young children face unique practical and psychosocial challenges, for which very few targeted interventions exist. Within this population, caregivers often report very high rates of parenting stress (Pinquart, 2017), emotional reactions such as denial, fear, and grief (Gentles et al., 2019), and unmet needs (Cramm & Neibor, 2011; McStay et al., 2014). Psychoeducation programs have been associated with improved parental quality of life, increased understanding of a child’s disorder, and decreased parental feelings of isolation (Garcia Rodriguez et al., 2022). Several non-experimental studies of psychoeducation programs for parents of children with autism report increased levels of autism knowledge and family empowerment (Pillay et al., 2011; Farmer & Reuter, 2013). Based on this emerging literature, Autism 101 was developed as a manualized 6-week psychoeducational intervention designed to address the unique post-diagnostic needs of families of young children with ASD.

Objectives: This non-experimental pilot study evaluates patient satisfaction, engagement, and treatment adherence. Rates of parenting stress, parental coping, parental perceptions of ASD, and sense of empowerment were also explored pre- and post-intervention using both quantitative and qualitative methods.

Methods: This is a convergent mixed-methods open trial of Autism 101. A convenience sample of participants was recruited through a developmental behavioral pediatrics clinic located in Texas. 12 groups were led by 8 trained facilitators and conducted via telehealth. Treatment adherence was rated by independent observers who attended each session. Quantitative data (questionnaires completed pre-/post-intervention) were analyzed using one-sample t-tests and Wilcoxon sign rank tests. All survey measures were selected for their adequate psychometric properties and had previously been validated for use with this population. Qualitative data (focus group interviews) were collected by an independent non-facilitator following the final session.

Results: Participants were 38 caregivers of 40 children (67.50% White, 12.50% Black/African American, 7.50% Asian, 12.50% Other/Decline to Respond; 37.50% Hispanic/Latino) who had received an ASD diagnosis within the past 6 months. Patient satisfaction was rated highly, such that 96.60% reported being “mostly” or “very” satisfied and 91.70% reported that “most” or “all” of their needs had been met. Participant engagement was high, with an overall attendance rate of 91.90%. Treatment adherence was rated as 85.80% overall. Participants reported increased rates of cognitive reframing, illness coherence (i.e., parental understanding of ASD), and family empowerment, and decreased rates of negative emotional reactions. No significant differences were observed in parenting stress or social support. Focus group data provided rich descriptions of participant experiences and insight into cognitive and emotional change processes. Table 1 summarizes the quantitative and qualitative findings, including statistical results for significant findings.

Conclusions: The current study provides strong initial evidence for Autism 101. Participants rated the intervention as useful and reported high rates of satisfaction. Attendance and engagement rates were high and preliminary findings suggest the potential clinical utility of this intervention. Future directions include the addition of a randomized control group to assess whether observed changes are attributable to the intervention.

423.159 (Poster) Parent and Clinician Perspectives on the Acceptability of Pediatric Autism Therapies
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Background: Autistic children and their families may access different services, such as occupational therapy (OT), speech language pathology (SLP) services, applied behaviour analysis (ABA)-based therapies and physiotherapy (PT). There are varying levels of evidence supporting the efficacy of these therapies, and some autistic-led advocacy is critical of the methods and aims of certain services. There is limited information about the perspectives of parents of autistic children and clinicians on the acceptability of these services. Exploring stakeholder perspectives is critical to ensure services are appropriate and informed by lived experiences. This work is part of a larger survey that also explored autistic individuals’ perspectives.

Objectives: This study explored how parents of autistic children and clinicians perceived the acceptability of pediatric autism therapies (OT, SLP services, ABA-based therapies, PT).

Methods: Using the Theoretical Framework of Acceptability (TFA), a mixed methods survey was built with input from autistic people, parents of autistic children and clinicians. The survey was shared online to a wide group of parents and clinicians. Demographic data and perspectives on the therapies were captured. An acceptability sub-score was produced for each therapy, ranging from 0 (least accepting) to 64 (most accepting). The sub-scores were combined into an overall acceptability score. Following the TFA, open-ended questions were qualitatively analyzed using deductive content analysis, and constructs of intervention coherence and ethicality are presented.

Results: For the 140 clinicians who completed the survey, the median (range) sub-scores were: OT 46 (16 – 59), SLP 47 (24 – 60), ABA 34 (9 – 60), PT 40 (14 – 60). For the 87 parents and carepartners who completed the survey, the median (range) sub-scores were: OT 40 (16 – 60), SLP 41 (14 – 58), ABA 28 (7 – 54), PT 35 (25 – 57). Qualitative categories within the TFA construct of ethicality included concerns about compliance or external reinforcement, reported or potential harms, and importance of engaging with autistic adults. The construct of intervention coherence reflects an individual’s understanding of a therapy, and respondents viewed goals as unacceptable or acceptable. With respect to intervention coherence, acceptable goals highlighted by respondents included those that are client and family-driven, inclusive of multi-modal communication, and support sensory needs. The goal of behaviour change was variably viewed as acceptable or unacceptable. Respondents who viewed this goal as acceptable identified that ABA could teach skills (i.e., toileting) or decrease behaviours (i.e., self-injury). Conversely, respondents who described the goal of behaviour change as unacceptable were often critical of the promotion of neurotypical behaviors.

Conclusions: For both parent and clinician respondents, the ethicality of these therapies was important to their acceptability. ABA-based therapies have been critiqued elsewhere, and many respondents shared similar criticisms, most often related to promoting neurotypical behaviour. However, many respondents viewed skill-building as an acceptable goal. This research contributes to the important conversation as to how and why therapies, or aspects of therapies, can meaningfully support autistic children. Notably, many respondents were wealthy, well-educated, and white. Future work should learn from more diverse samples of parents and clinicians.

423.160 (Poster) Characteristics of the Sibling Relationship from the Perspective of Young Autistic Adults
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Background: The immediate environment, including the family, influences the adoption of values and behaviors promoting the health and well-being of young people. Family relationships are a topic of interest for research and a focus for interventions carried out by health professionals. The role of parents in the development is amply addressed. The role of siblings and sibling relationships, whether positive and harmonious or conflictual, contribute to psychosocial health. In autism, most research documents the sibling relationship by taking into account solely the perception of the non-autistic sibling. Research taking into account the point of view of young people with autism is still rare. It is necessary to develop a bilateral portrait of this relationship. This study gives space so that they can voice their experience in their fraternal relationship. Objectives: We aim to develop a tool and determine the elements characterizing the sibling relationship from the perspective of young people with autism.

Methods: Following a review of the literature and consultation of six young people on the autism spectrum (mean age: 23.7 years old; 2 women), we developed a guided interview composed of 28 questions. With this guide, a descriptive qualitative study was carried out with 15 young autistic adults (mean age: 22.2 years old; 8 women) in Quebec, Canada. We asked the participants to answer the questions with mind patterns and mind relationships with a specific brother or sister. We organized and categorized the data into themes through discourse analysis to identify patterns and establish connections (Given, 2008).

Results: Four dimensions and 16 themes structure the elements characterizing the fraternal relationship. These are: characteristics of contacts composed of 3 themes (frequency, mean to make contact, physical proximity), characteristics of the interactions defined by 2 themes (content, common interest and activities), quality of the relationship consisting of 8 themes (acceptance, expectations, admiration, appreciation, affection, trust and confidence, conflict and rivalry, evolution) and support defined by 3 themes (reassurance, model, mutual aid).
Conclusions: People with autism play an active role in sibling relationships. This study brings support to the demonstration of their ability to reflect and share their introspection on their relationship, roles, desires and needs. According to the perception of young autistic people, the sibling relationship is an evolving one. During childhood, the rivalry seems more pronounced. When they become young adults, they evoke the presence of reciprocal advice during the adult transition and emotional support as the consideration of parental advice decreases. Recognizing the role and understanding the elements that characterize the sibling relationship in young autistic people would allow professionals to acknowledge the nature of this relationship better and adjust their support from an ecosystemic approach by considering the sibling relationship as a resource in health promotion.

423.161 (Poster) Parent-Reported Positive Attributes in Children and Adolescents with Autism during the COVID19 Pandemic

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Background:

The COVID19 pandemic has impacted individuals with autism spectrum disorder (ASD) and their families. In our study conducted during lockdown in 2020, we found that individuals with ASD had difficulty understanding the concept of lockdown and had new onset behavioral issues (1). Interestingly, families also reported positive changes, which are not frequently cited (2). To investigate the ongoing impact of the pandemic and understand coping within families, we conducted a mixed methods study in mid-2021. This report is based on part-data from this study.

Objectives:

We catalogue positive attributes reported by parents of individuals with ASD during the COVID19 pandemic.

Methods:

Using phone numbers from our database, we randomly contacted parents / care givers for online Focused Group Discussions (FGDs) on Google Meet platform. We had five discussions in all. Two involved parents of children between 2-12 years of age and two sessions where the index children were 13-25 years of age, while one involved parents of index subjects between 2 and 25 years of age. The meetings were audio and video recorded and the recordings anonymized. Two members of the research team then independently analyzed this data to derive themes using standard qualitative research methods. We report the analysis of positive changes shared by parents during these meetings.

Results:

A total of 25 parents participated in FGDs across 5 sessions. Index ASD subjects had moderate to severe ASD. Parent’s report could be grouped into four major themes – positive coping, hobbies that could be introduced regularly, sports and interpersonal skills. With respect to positive coping, individuals engaged in activities such as cleaning, household chores, cooking and gardening regularly during the pandemic. Many showed willingness to get introduced to and learn new hobby skills such as drawing, handwriting, piano, keyboard, and foreign language. They also were interested in sports such as badminton, cycling and skating. Many parents noticed positive changes in interpersonal skills such as initiating communication, better play skills, caring when family members were unwell, bonding with siblings, and improvement in verbal skills for social communication.

Conclusions:

We have showcased positive attributes in individuals with ASD during the pandemic as reported by parents. The pandemic enabled the caregivers to appreciate strengths and positive qualities even in those with moderate to severe ASD. Our study included parents with children from 2 years of age, unlike most studies in literature that highlight positive qualities in older adolescents and adults with ASD (2,3). Such positive attributes can provide a much-needed perspective to families and also help clinicians to manipulate therapy techniques. In limited resource contexts like in India, especially for younger individuals with ASD, it is possible that strength-based models could effectively supplement parent-led home-based interventions. There is need for further research to understand how to strengthen these skills without causing caregiver burnout and promote them to improve quality of life in individuals with ASD and their families, in the post-pandemic world.
Background: Parenting an autistic adolescent with intellectual disability (ID) and anxiety can be challenging, particularly when difficult daily decisions need to be made surrounding anxiety management and/or accommodation (i.e., whether behavior or demands are reduced as a means of minimizing distress within anxious situations; Frank et al., 2022). These decisions are further complicated if anxiety is contributing to challenging behavior, such as aggression or disruptive behavior (Moskowitz et al., 2013), which pose safety risks for families. However, excessive accommodations sometimes result in parents “taking over,” leading to reduced child independence and autonomy (Sandjojo et al., 2018). In autistic youth without ID, excessive accommodation is often associated with increased anxiety and externalizing symptoms, thus negatively impacting anxiety treatment outcome (Frank et al., 2022). This study seeks to understand the relationship among teen anxiety, challenging behaviors, and the parent accommodation of anxiety in autistic teens with ID, given the gap in the literature. These findings may have important implications on treatment and community participation.

Objectives: Evaluate the relationship between parent-reported anxiety, challenging behavior, and parental accommodation in anxiety treatment-seeking autistic teens with ID and anxiety.

Methods: Twenty-eight autistic teens (mean age 15.7 years) with ID and anxiety completed a baseline evaluation for participation in a cognitive behavioral therapy (CBT) anxiety-treatment program (Facing Your Fears: IDD). All participants met criteria for autism spectrum disorder (ASD) on the ADOS-2 (Lord et al. 2012), had IQ and adaptive behavior scores below 76, and met criteria for at least one anxiety diagnosis on the ADIS-Autism Spectrum Addendum (ADIS-ASA; Kerns et al., 2017). See Table 1. Parents completed the Anxiety Depression and Mood Scale (ADAMS; Esbensen et al., 2003), a measure designed to screen for psychiatric disorders in individuals with ID. Challenging behavior was assessed using the Irritability subscale on the Aberrant Behavior Checklist-Community (ABC-C; Aman, 2012). The Family Accommodation Scale-Anxiety (FASA; Lebowitz et al., 2013) was used to assess parental accommodation of anxiety-specific behaviors, with higher scores indicating more parental accommodation and possible scores ranging from 0-36. Data collection is ongoing.

Results: All parents reported some accommodation for their teen’s anxiety symptoms (FASA; M = 22.07, SD = 7.65). Results suggest significant positive correlations between parental accommodation and the ABC-C Irritability (r = .43, p = .02) and ADAMS General Anxiety subscales at pre-treatment (r = .41, p = .03). Increased anxiety severity and irritability is associated with more parental accommodation of anxiety symptoms in autistic teens with ID.

Conclusions: Consistent with research on autistic youth without ID (Frank et al., 2022), our results suggest a significant positive relationship between anxiety, challenging behavior, and parental accommodation in autistic teens with ID. While some parental accommodation may be necessary given the co-occurring cognitive impairments in their teens, too much accommodation may be concerning as it may interfere in treatment outcome. Tailored approaches to anxiety treatment are likely needed to address the complex needs and presentation of this population. Limitations include a small sample size, the reliance on parent-report, and that the FASA has not been normed on youth with ID.

Background: It is well-documented that family members of individuals with autism display elevated autistic traits, known as the broader autism phenotype (BAP; Piven et al., 1997), which has been associated with comorbid mental health challenges, such anxiety and depression (e.g., Lau et al., 2014, Su et al., 2017).

Independent of these traits, parental stress associated with raising a child with autism is higher compared to parents of typically developing children and those with other developmental delays (e.g. Hutton & Caron, 2005).

Finally, recent work points to high rates of family accommodation (i.e., proactive modifications made by family members intended to decrease their child’s distress, stemming from the child’s psychopathology) of RRBs among parents of autistic children. Such accommodation is associated with elevated child symptomatology and reduced adaptive functioning, as well as increased parenting stress (Feldman et al., 2019; Koller et al., 2021).
Given the above, it is important to examine how parents of autistic children cope with parenting stress and how such coping strategies associate with parental characteristics and behavior.

Objectives: To examine the associations between parental autistic traits, family accommodation and coping strategies among parents of young children with autism. Secondarily, to ascertain the correlation between FA patterns reported by co-parents in two parent families.

Methods: These data are part of a longitudinal study of children recently diagnosed with autism and their families. Participants were 31 children at time of diagnosis (26 males; mean age: 39.84 months). Children received a gold-standard evaluation including measures of child development (Mullen Scales of Early Learning; Mullen, 1995) autism symptomatology (ADOS-2; Lord et al., 2000; RBS-R; Bodfish et al, 2000) and adaptive functioning (ABAS-3; Harrison & Oakland, 2015). For the current study, parents completed self-report measures of their own autistic traits (BAP;Hurley et al., 2007), coping strategies (Brief COPE; Carver, 1997) and accommodation behavior (FAS-RRB; Feldman et al., 2019).

Results: Pearson correlations were calculated to examine the association between family accommodation, the BAP and Brief COPE questionnaires.

Significant negative correlations were found between mothers’ and fathers’ BAP scores and their coping strategies in stressful situations, including strategies to regulate emotional distress, (r(30)=.507, p<0.01), (r(27)=-.402*,p< 0.05) to try to solve problems (r(30)=-.405, p< 0.05), (r(27)= -.449, p<0.05) and to receive emotional comfort and soothing (r(30)=-.484, p<0.01) (r(27)=-.415*,p< 0.05). No correlation was found between parents’ coping strategies and accommodation, although a significant positive correlation was found between co-parents reported accommodation behavior (r(26)= 684,p<0.01).

Conclusions: This study sheds light on the relationship between parental autistic traits, behavior, and coping strategies. These results indicate that parents with elevated autistic traits display fewer coping strategies in stressful situations. The current study did not find a correlation between coping and accommodation, but did indicate that, in two-parent families, co-parents display similar levels of accommodation. These findings are a stepping stone to future research designed to elucidate profiles of parents of autistic children who may benefit from targeted support.

423.164 (Poster) Parental Coping Stategies in Mothers of Children with Autism, and Children with Attention Deficit Hyperactivity Disorder

Background: Coping strategies are considered a stabilizing factor, since it facilitates the individual adjustment and adaptation when faced with stressful situations. Most studies have indicated that raising a child with Autism spectrum disorder (ASD) or Attention deficit hyperactivity disorder (ADHD) can result in marked psychological distress for many parents (Graig et al., 2020; Hastings, 2008). However, parents vary substantially in their ability to successfully face the challenges linked to their child’s difficulties (Benson & Karlof, 2009). Despite a growing interest in parental coping strategies used with ASD children and ADHD children, few studies have analyzed in depth the dimensions of coping strategies developed by mothers of children with neurodevelopmental problems.

Objectives: The aim of this study is to explore parental coping strategies in mothers of children with neurodevelopmental disorders (ASD and ADHD) and to analyse the differences with a typically developing group.

Methods: This study includes 3 groups of mothers of children with a range of age between 7 to 11; 22 with Autism Spectrum Disorder without intellectual disability, 24 with ADHD and 32 typically developing children. The three groups of children, with ASD, ADHD and TD, were matched on age (F(2,75) = 1.98, p = 0.14), IQ (F(2,75) = 0.41, p = 0.66), and also vocabulary. The mothers’ mean age was 39.15 (SD = 3.7). Families were recruited through specialized centres from Spain. Mothers full filled the Coping Orientation to Problems Experienced (Brief COPE) questionnaire using the factorization of Benson (2010), and clinical psychologists confirmed the diagnosis of the clinical sample.

Results: The analyses of variance conducted yielded statistically significant differences between mothers of children with neurodevelopmental disorders and mothers of typically developing children in the dimensions of Disengagement and Distraction, with moderate effect sizes. Moreover, the results evidenced that the mothers of children with ASD did not differ significantly from the mothers of children with ADHD in any of the coping dimensions analysed.

Conclusions: The findings suggest that mothers of ASD and ADHD children show similar trend than parents of typical developing children on some coping strategies such as, active planning, problem-solving, or seeking support from others. However, mothers of children with neurodevelopmental disorders tend to develop maladaptive coping strategies focused on distracting, denying, or avoiding stressful situations, in line with other studies (Benson, 2014; Smith et al., 2008). In addition, factors such as child’s age, sociodemographic variables
and parental mental health should be taken into consideration in future studies. It is noteworthy the need to design interventions that seek to reduce parents’ use of disengagement and distraction, while facilitating their use of engagement and cognitive reframing strategies.

423.165 (Poster) Parental Experience of an Early Developmental Surveillance Program for Autism within Australian General Practice: A Qualitative Study

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Background: Implementing supports early in the life course has been shown to promote positive developmental outcomes for children at high likelihood of developmental disabilities, including autism. Around one in five Australian children are “developmentally vulnerable” when they start primary school, with evidence that in some areas, particularly rural or remote areas, only 20-30% of preschool age children access recommended developmental surveillance and/or early support programs. These programs promote child health and development via developmental surveillance, and provide advice to promote child and family wellbeing.

Objectives: This study examined parents/caregivers’ experiences and perceptions about a digital developmental surveillance pathway for autism, the Autism Surveillance Pathway (ASP), and usual care, the Surveillance as Usual (SaU) pathway, in a primary healthcare setting with general practitioners (GPs; family doctors).

Methods: This qualitative study utilised a convenience sampling from the full sample of parents/caregivers that participated in the main program “GP Surveillance for Autism” (Barbaro et al., 2021), a cluster-randomised controlled trial study. Semi-structured interviews were conducted over the phone, with all interviews audio-recorded, transcribed, and coded using NVivo 12 software. An inductive thematic interpretative approach was adopted for data analysis. Twelve parents/caregivers of children with or without a developmental disability participated from the main program in South-West Sydney and metropolitan Melbourne, Australia.

Results: Seven major themes and 20 sub-themes were identified and classified as: overlapping enablers for both pathways; ASP pathway-specific enablers; overlapping barriers for both pathways; SaU pathway-specific barriers; ASP pathway-specific barrier; overlapping recommendations for both pathways; and SaU pathway-specific recommendations. These included positive experiences, such as pre-existing patient-doctor relationships and their perceptions on the importance of knowing about and accessing early supports and services. Barriers or challenges experienced while using the SaU pathway included long waiting periods, poor communication and lack of action plans, complexity associated with navigating the healthcare system, and lack of understanding by GPs. As much of the study was conducted during the COVID-19 pandemic and associated lockdowns, the effects of reduced access to supports and services, particularly in-person appointments, was a barrier for all families. Common suggestions for improvement included parents/caregivers having greater awareness of and education on child development, as well as access to accessible resources on child development for families.

Conclusions: Multiple factors influencing parents/caregivers’ utilisation of general developmental and autism surveillance tools within primary healthcare services emerged from this qualitative study. While participants in both pathways identified common enablers and barriers, and made similar improvement recommendations, those in the SaU pathway identified more barriers. Most parents/caregivers reported positive attitudes towards and experiences with their GPs, which improved their overall health-care experiences and wellbeing. The findings of this study support the use of digital screening tools for developmental surveillance, including for autism, using opportunistic contacts in the general practice setting. The inclusion of developmental surveillance and time to discuss developmental concerns in public health-care programs should be considered. The results also suggest that education for GPs, families, and the wider community about child development and developmental disabilities, including autism, is needed.

423.166 (Poster) Parental Hopes and Young Adult Futures: Caregiver Perspectives on the Transition to Adulthood with and without IDD

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Background: The transition to adulthood for individuals with intellectual and developmental disabilities (IDD) creates unique challenges, especially limited or non-existent services (Howlin & Moss, 2012; Taylor & Seltzer, 2011). Literature suggests that young adults with IDD experience poor outcomes, e.g., low employment and postsecondary graduation rates (Mason et al., 2021). Previous work highlights the need to develop services and supports available to youth with IDDs before leaving high school, particularly in comparison to their neurotypical (NT) peers.

Objectives: This study aims to explore support received (i.e., services and resources) by young adults with and without IDD in preparation for the transition into adulthood, as well as needed supports reported by caregivers and youth. Research questions include: (1) What support
did young adults with and without IDD receive during the transition into adulthood? (2) What support do caregivers wish existed for their young adults with and without IDD during the transition into adulthood?

Methods: Caregivers (N = 118; 89% were mothers) were interviewed about their overall experience with their young adults’ (n=114, age range: 20-25 [M=21.8]; IDD n=57; NT n=57) transition into adulthood. The IDD group includes young adults with autism spectrum disorder (ASD), intellectual disability (ID), and ASD+ID. A thematic analysis was conducted on two interview questions addressed to caregivers: (1) Was there anything that they, their young adult, or the school did that helped in the transition? and (2) Were there any ways the service systems could have better supported the transition?

Results: Two main themes emerged for question one: Types of Support Sought and Sources of Support Provided (i.e., who provided the resource/service). The most reported types of support included: social support (26.4%), adaptive skills (18.3%), and transition-specific preparation (14.9%). As for the Source of Support, the most frequently reported included: caregiver/family (41.3%), school (25.7%), and young adult (17%). Differences across the two groups emerged in terms of Types of Support; the NT group reported academics in the top three instead of transition-specific preparation. Question two identified two main themes: Barriers and Facilitators (13 codes total) during the transition period. Although caregivers were asked how the service systems could have better supported the transition, some mentioned facilitators. The most frequently reported Barriers included: accessibility of services/information (24.1%), career planning/preparation (13.4%), and adaptive skills/executive functioning (13.4%). The most frequently reported Facilitators included: guidance on transition (38.9%), adaptive skills/executive functioning (13.9%), and accessibility of services/information (13.9%). Differences were seen across groups for barriers to accessibility of services, which was almost exclusively mentioned in the IDD group (36% vs. 2.4%).

Conclusions: Interestingly, both groups report similar types of support received, and barriers encountered, suggesting that overall, caregivers of young adults with and without IDD seek similar support during the transition period. However, the types of support varied depending on the young adult’s postsecondary goals (e.g., NT group reported academics more frequently). These findings may provide insight into how to individualize transition support and consider the presence of a disability when evaluating needs and support.

Background:
Responsive and sensitive parenting are pivotal to support a child’s social engagement and to promote an enriching environment that maximizes both cognitive and social learning opportunities. Responsive parents are aware of their child’s, even subtle, behavioral cues and interests, affirming them in a warm and comfortable atmosphere. Conversely, a more structured and directive parental interaction style tends to lead children’s behavior, anticipating their initiatives, instructing and prompting them.

Autism is a neurodevelopmental condition that affects, very early on, parent-child interactions. Autism risk infants show significantly less interest and motivation toward the social world and the parental initiatives ultimately influencing the parent’s interactive attitude.

Previous evidence suggests that mothers of autism children are more directive than mothers of typically developing (TD) ones, are focused on their child’s skills achievement and tend to have more structured interactions.

Objectives: Based on prior research, we aimed to investigate interaction style’s characteristics in mothers of young children with and without autism during naturalistic joint play activities.

Methods: Our sample included 40 young children with and without autism (n=22 children with autism; 8 females and n=18 TD; 9 females), matched according to the developmental age of the autistic children (21.4 months, SD=4.6).

Parent-child interaction (PCI) consisted in a standardized paradigm of free play with a set of developmentally appropriate toys. Parents were instructed to play with their children as they normally used to do and play interactions of both mothers and fathers were video-recorded for a 10 minute time. For the purpose of this preliminary study we analyzed the sample of mothers by using the Maternal Behavior Rating Scale - revised (MBRS - Mahoney, 2008) to measure mother’s interaction style. The MBRS assesses four interactive style factors: responsive/child oriented, affect/animation, achievement orientation and directive.

Results: We found that mothers of typical development children are significantly more responsive (W(40)= 137, p<0.001) and display higher positive affect and animation (W(40)= 125, p= 0.002) than mothers of children with autism.
Conclusions: Parent-child interaction is a key factor to promoting social learning and early development. Our study highlights lower responsiveness and positive affect in mothers of young children with autism during naturalistic parent-child interactions. These findings have important implications on parent-mediated intervention programs that aim to support a positive parental style and to maximize child’s joint engagement, communication opportunities and social motivation.

423.168 (Poster) Parental Perspectives on the Everyday Experiences of Uncertainty Among Young Children on the Autism Spectrum
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Background: People on the autism spectrum are at an increased risk for mental health difficulties across the lifespan, with anxiety being the most common. Heightened anxiety also appear in early life for children on the spectrum, which can increase in severity over time. Exploring and better understanding potential underpinning mechanisms contributing to and maintaining anxiety in the early years is therefore important in informing effective and timely supports. Several potential mechanisms of anxiety have been suggested, with recent evidence highlighting the prominent role of Intolerance of Uncertainty (IU). IU, a tendency to find uncertainty difficult, is a transdiagnostic mechanism contributing to the development and maintenance of anxiety in the general population, but little is known about how IU may present in or impact upon young children on the spectrum.

Objectives: The study investigated parents’ perspectives of their child’s experiences of uncertainty, exploring presentations, the impact on children and families, and parental management strategies.

Methods: Parents of 13 children aged 4-7 years with an autism diagnosis participated in focus groups. Five research questions were explored: (1) Situational triggers of anxiety and distress relating to uncertainty; (2) Manifestations of IU in young children; (3) Differences in experiences with uncertainty compared to non-autistic children; (4) Impact of IU and anxiety; (5) Parental management of children’s IU. Participants were recruited until data saturation was reached. Applied thematic analysis using a framework analysis approach was employed. Although specific research questions were identified deductively, a primarily inductive approach was adopted in the coding and analysis process. A codebook was used to facilitate dialogue and reflexivity between researchers and inter-coder reliability was established at 97.5%.

Results: 18 themes were identified in relation to the five research questions. Parents identified anticipatory unknowns and unexpected events as triggers of anxiety relating to uncertainty. Parents also described several different anxious and distressing child emotional and behavioural responses to uncertainty, which were perceived as more intense compared to the responses of non-autistic children. Some behaviours were associated with or exacerbated by autism characteristics, such as sensory sensitivities and insistence on sameness. Most parents reported that difficulties with uncertainty had a significant negative impact on child and family well-being. Parents also described various strategies aimed to reduce uncertainty, create certainty or increase children’s ability to cope with uncertainty.

Conclusions: Our findings suggest that parents perceive IU as an important and relevant construct that manifested in their child’s heightened reactivity to uncertain situations. Parents discussed the complex overlap and intertwined relationship between autism characteristics and IU, consistent with previous findings with older children and adults on the spectrum. Given that IU can present early in life for children on the spectrum, with distressing experiences that can negatively impact the everyday lives and well-being of children and family, further research into early and targeted interventions is needed as it may potentially alter the onset and/or trajectories of childhood anxiety and longer-term impact associated with anxiety. These findings have informed the evaluation of a targeted parent-mediated intervention to support children in managing difficulties with uncertainty.

423.169 (Poster) Parental Views of Families of Children with Autism Spectrum Disorder and Developmental Disorders during the COVID-19 Pandemic
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Background: The COVID-19 pandemic, the infection caused by the novel coronavirus detected in December 2019 by World Health Organization (WHO), has detrimentally impacted human life in a variety of areas. Many concepts including outbreak, pandemic, and quarantine have been an inseparable part of our lives. This kind of dialectic change naturally affects persons with autism spectrum disorder (ASD) and developmental disorders (DD) and their families. The present study using a mixed-method evaluation aims to reveal the impacts of the COVID-19 pandemic on the family functioning of children specifically with ASD in Turkey. This study promises a holistic understanding of how the lockdown depending on the COVID-19 pandemic affects families and their children with ASD with positive and negative sides.
Objectives: The purpose of the present study was to investigate the impact of the lockdown and curfew associated with the COVID-19 coronavirus pandemic on the family life of children with ASD in Turkey by integrating qualitative and quantitative methods.

Methods: A concurrent (or convergent) mixed methods design was used to investigate the research questions and the results were compared simultaneously, which is also called Type D: Concurrent triangulation design (Creswell & Plano Clark, 2006; Creswell et al., 2003).

Results: Considering the viewpoints of parents, a predominant subcategory within the study’s themes was “shared more family time and increased family interaction” under the positive effect of the COVID-19 on family life. Most parents, especially fathers, expressed lack of time to spend time together with families because they need to work as either white or blue-collar workers in the workforce until lockdown and curfew depending on the COVID-19 pandemic. Undoubtedly, “the unmet educational needs of the children with ASD” has been the most emphasized issue by parents during the pandemic in the present study. Suspending of educational services depending on pandemic lockdown was highlighted as a significant challenge for children in other some research (Fontanesi et al., 2020; Masters et al., 2020). However, parents expressed increased verbal behaviors of their children with ASD as a result of increased family interaction during the pandemic. Increasing the verbal behavior has always become one of the main goals of early and intensive behavioral services which are a widespread treatment approach for children with ASD (Eldevik et al., 2009; Ingvarsson, 2016). Therefore, positive appraisals of parents on especially expressive language skills that sounds promising in communication development of children with ASD is a remarkable result during the quarantine.

Conclusions: One of the most critical lessons that emerged from the current study is that more comprehensive research needs to be conducted on the effects of COVID-19 on families of children specifically with ASD. Secondly, all stakeholders including families, researchers, professionals, or policymakers should use a holistic lens indicating negative as well as positive aspects to understand the impacts of the COVID-19 pandemic.

423.170 (Poster) Parenting Autistic Adults As They Enter the Job-Market: A Qualitative Exploration of the 'tal-Program' Parents' Group Meetings

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Background:

Family support is a central part of the eco-system promoting employment goals for autistic adults (Nicholas et al. 2018). Parental factors such as participation in educational activities and having high expectations of their children predicted functional performance and employment outcomes in adulthood (Kirby et al., 2016; Wong et al., 2020). Additional studies suggest that parental involvement, combined with ‘real-life’ experiences and exploration the autistic adults, can promote a realistic and effective transition plan (Chen et al., 2018). The ‘Tal-Program’ is a government funded employment intervention for autistic adults in Israel. Along with a broad curriculum of employment-related skills and job market experience, the program offers biweekly group meetings for the parents of the participants. Exploring the parents’ group-related experiences can shed light on their main issues of concern regarding the transition to employment, as well as general views, self-concepts, roles and self-perceptions.

Objectives:

To explore the parental experience of parents of autistic adults participating in an employment transition program, as they enter adulthood and employment.

Methods:

Participants were 12 parents of autistic adults (11 females; mean age: 55) who were purposefully sampled according to a high attendance rate and participation in the group meetings. Semi structured narrative interviews were carried out (Rosenthal, 1993) beginning with an open question concerning the experience of taking part in the group meetings, with minimal interruption. Next, specific questions covered subjects that called for further inquiry and other aspects of the transition to adulthood and employment. Background data were collected. A Dialogical Narrative Analysis (Smith & Monforte, 2020) was employed for data analysis.

Results:

Parental experiences and views emerged along three central themes: Autism diagnosis. Participants shared accounts of acceptance vs. rejection of the child’s autism diagnosis and possible consequences, mentioning comparisons to the same-aged typically developing peer group. Such conflicts also echoed in reports of disclosure vs. concealment of the diagnosis, even to the close circle of friends and relatives.
Through dynamic conversations in the group meetings, possible relationship between parental acceptance of the child's autism, autism disclosure and choosing attainable employment goals were realized; Independence vs. support. Questions were raised in the group meetings discussing if and how to be involved in the child’s vocational activities. Contradictions between statements about the child’s high independence alongside stories portraying significant parental involvement demonstrated the difficulty attaining a balance in relation to vocational activities. Parents' expectations for workplace accommodations and job adaptations were not always feasible in the job-market context; The significance of the group. Parental accounts indicated that the group provided them an opportunity to feel that they are not alone, receive support and validation for their feelings, actions and concerns and expand their point of view.

Conclusions:

Supporting the developmental tasks of adult autistic children can make old conflicts rise and new ones emerge for parents. The group sessions offered a space in which central issues were discussed and reconciled, promoting well-being of parents along with better support for their children. Appropriate phase-related guidance for parents is valuable throughout the life-span.

423.171  (Poster) Parenting Behavior Among Autistic Children with or without ADHD

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Background: Although attentional and behavioral problems often co-occur in children with ASD, few studies have explored differences in parent-child interactions among autistic children with and without comorbid attentions-deficit/hyperactivity disorder (ADHD). Yet, emerging evidence suggests that parenting factors, such as parenting styles, attitudes, and attunement, may be linked to externalizing problems in children with ASD. Positive parenting, characterized by parental support, sensitivity, and responsiveness, has been associated with decreased ADHD symptoms in longitudinal studies involving mother-child dyads. This small, but growing body of literature, may be expanded with further exploration involving direct observation of parent and child behavior during dyadic interactions.

Objectives: This study investigated whether there are differences in dyadic interactions in a sample of children with ASD with and without ADHD symptoms.

Methods: Twenty-six autistic children (ages 3-11, 50% ADHD) participated in comprehensive clinical evaluations, including caregiver interviews and standardized assessments. Dyads participated in 20-minute parent-child interactions, including a warm-up period and three five-minute tasks: child-directed play, parent-directed play, and clean-up. Interactions were coded using the dyadic parent-child interaction coding system (DPICS). Repeated measures ANOVA was used to explore the interaction and main effects of task and diagnostic group on parenting and child behaviors.

Results: A main effect for task was observed for overall number of parent verbalizations, F=11.37, p<.001, reflections, which reflect child speech without changing the meaning, F=4.67, p=.02, praise, F=3.70, p=.03, questions, F=11.04, p<.001, commands, F=12.66, p<.001, and child compliance, F=8.40, p=.001. Parents spoke more during parent-directed play compared to other tasks. During child- and parent-led play, parents used less praise and more questions relative to clean-up, during which parents used fewer reflections. Commands and child compliance were significantly greater during parent-led play and clean-up.

An interaction effect was observed for neutral talk, which does not describe, qualify, or direct child behavior, F=3.29, p<.05, where parents of autistic children with ADHD used more neutral talk during child- and parent-led play, while dyads without ADHD used more during clean-up.

A main effect for diagnostic group was observed for parent use of negative talk, encompassing criticism of the child or their behavior, F=4.28, p=.05, with parents of autistic children with ADHD using more negative talk relative to those without ADHD, regardless of task.

Conclusions: In this sample, parent-child interactions differed in the context of changing task demands, often regardless of ADHD comorbidity. When instructed to direct their child’s play, parents of children with autism often spoke more, directing their child’s attention and engagement with commands and questions. However, while parents appear to be attuned to the usefulness of praise during a structured, routine clean-up task, they used less praise during unstructured tasks, whether child- or parent-directed. Parents of autistic children with comorbid ADHD were more likely to use criticism across situational contexts but fewer neutral verbalizations during clean-up. Overall, parents across groups may benefit from learning strategies to engage their children in play to promote positive adjustment and wellbeing.

423.172  (Poster) Parents' Adaptive Coping Strategies & Perceptions of Social Standing As Predictors of Youth Anxiety

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Background:

Research on the association between parent coping strategies and anxiety in youth with autism spectrum disorder (ASD) is limited despite children with ASD experiencing elevated levels of anxiety in comparison to typically developing children (Gillot et al., 2001) and research supporting the relation between parent behaviors and youth anxiety (Dadds et al., 1997). Furthermore, research is very limited in investigating differences in this association amongst populations of diverse, socioeconomic backgrounds. Therefore, the purpose of this study was to examine anxiety levels in youth with ASD and parents’ perceptions of social standing as predictors of parents’ adaptive coping strategies.

Objectives:

The aim of this study was to examine parents’ perceptions of social standing and anxiety in children and adolescents with ASD as predictors of parents’ adaptive coping strategies.

Methods:

The data utilized for this study stems from a larger web-based survey involving adults with developmental disabilities (DD), parents of children with DD, and parents and children with DD. Data was collected within a 13-week period and aimed to understand the experiences of individuals impacted by DD during the COVID-19 pandemic. The participants in this study included 35 parents of children and adolescents with ASD. Children and adolescents ranged from ages 3 to 19. Parents completed the Brief Resilient Coping Scale (BRCS; Sinclair & Wallston, 2004) to assess adaptive coping strategies, the Generalized Anxiety Scale (GAD-7; Spitzer et al., 2006) to measure youth anxiety symptoms, and the Community Ladder subscale of the MacArthur Scale of Subjective Social Status (Adler et al., 2000) to assess parents’ perceptions of social standing within their communities.

Results:

Results from a multiple regression analysis indicated a statistically significant interaction effect of youth anxiety and parents’ perceptions of social standing on parents’ use of adaptive coping strategies. The interaction effect accounted for 12% of the variance in the parents’ adaptive coping scores. A Johnson-Neyman interval was conducted and indicated that the association between parents’ adaptive coping and youth anxiety is not significant when perceptions of social standing are at the mean or 1 SD below the mean. Inversely, the relation between parents’ adaptive coping and youth anxiety is significant when perceptions of social standing are 1 SD above the mean.

Conclusions:

Overall, these results demonstrate that anxiety in children and adolescents with ASD is substantially elevated when caregivers perceive themselves as within groups of high social standing in their communities and use the least amount of adaptive coping strategies.

423.173 (Poster) Parents’ Perceptions of Service Needs and Expectations for Their Autistic Children during the Transition to Adulthood

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Background: The transition to adulthood can be a turbulent period for autistic individuals and their family members. Previous studies have identified various service needs of autistic individuals as they transition to adulthood (Anderson et al., 2018), often by collecting qualitative data from parent interviews. However, no studies have explored whether parents’ perceptions and expectations during this transition period differ based on their children’s language level and communication skills.

Objectives:

1. What services do parents believe will help their children transition to adulthood, and do these perceptions differ by child language level?
2. Do parents’ expectations for their children’s future relate to child language level and communication skills?

Methods: The sample (N=56; 44M, 12F) included 34 parents of verbal individuals with autism (Parents-V) and 22 parents of minimally/nonverbal individuals with autism (Parents-MV). Autistic individuals ranged in age from 16.00 to 25.45 years old (M=19.29). Child language level was measured using one question from our parent-report demographics form: “What is your child’s verbal ability?” with response options: verbal, minimally verbal, nonverbal. The Vineland Adaptive Behavior Scales (VABS-3) domain level form was also used to assess child communication skills. A trained researcher conducted semi-structured interviews with parents via Zoom. Interviews included questions related to sensory sensitivities and the transition to adulthood. To address our first objective, we used qualitative content analysis to code responses from two interview questions: “What services or interventions would help your child move into adulthood?” and
“Are there gaps in available services or interventions?” To address our second objective, we used a questionnaire created by Ivey (2004), in which parents rated the extent to which they believed that their child would accomplish different milestones in adulthood (Table 1).

**Results:** Content analysis revealed nine service types that parents believed would help their children transition to adulthood (Table 2). Chi-square tests showed that the proportion of parents who mentioned each service type did not significantly differ between child language level groups ($p^{2}=.129$), except for mental health care, which was endorsed more frequently by Parents-V than Parents-MV ($\chi^{2}=4.38, p=.036$). Independent samples t-tests showed that Parents-V ($M=3.88$) reported higher scores than Parents-MV ($M=2.90$) on the Ivey (2004) questionnaire ($t=4.76, p<.001$), with higher scores indicating greater likelihood of accomplishing milestones. Scores on this questionnaire were also positively correlated with VABS-3 communication domain standard scores ($r=.58, p<.001$).

**Conclusions:** Parents-V and Parents-MV believed that their autistic children would benefit from similar services during the transition to adulthood, except for mental health care, which was endorsed more frequently by Parents-V. This finding suggests that similar services could be provided to all autistic individuals, regardless of their language level, to address the dearth in available services during the transition to adulthood (Laxman et al., 2019). When compared to Parents-MV, Parents-V had higher expectations for what their children would accomplish in adulthood; parents’ expectations were also positively associated with their children’s communication skills. This finding suggests that parents’ expectations for their children’s “success” in adulthood differ based on their children’s language level and communication skills.

**423.174 (Poster) Participation and Quality of Life in Primary and Secondary Caregivers of Autistic Children**

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**Background:**

Parents of autistic children, particularly primary caregivers, often modify their participation across leisure, social, and workforce contexts to meet the caregiving needs of their child. Research suggests reduced participation in desired activities may play a role in the quality of life (QoL) of parents of autistic children. However, the literature focuses mostly on mothers and/or primary caregivers with the participation and QoL of fathers and/or secondary caregivers relatively unknown.

**Objectives:**

The aim in the current study was twofold: to examine differences in leisure, social, and workforce participation and QoL between primary and secondary caregivers of school-aged autistic children as well examining the contribution of participation on their QoL.

**Methods:**

Participants were recruited from a wider longitudinal study with 79 primary (94% mothers) and 54 secondary (89% fathers) caregivers of autistic children (aged 7-12 years). Health-related QoL (HRQoL), overall QoL, parenting stress, leisure participation, occupational gaps (i.e., activities that parents wish to engage in but currently are not), time pressure, and social support were measured via online questionnaires.

**Results:**

Significant differences were found with primary caregivers reporting poorer HRQoL ($p=.02, d=-.40$), added time pressures ($p=.01, d=-.51$), increased household labour hours ($p<.001, d=.74$), more childcare responsibility ($p<.001, d=1.03$), and fewer employment hours ($p<.001, d=-1.15$) than secondary caregivers. Differences were not found between primary and secondary caregivers in frequency of leisure participation, the number of occupational gaps, or overall QoL. Despite no differences in total parenting stress, primary caregivers reported significantly higher scores on the parenting distress domain than secondary caregivers ($p=.03, d=-.39$).

For primary caregivers, hierarchical multiple regression identified household labour hours ($\beta=-.23, p=.03$) and occupational gaps ($\beta=-.40, p<.001$) as significant predictors of overall QoL, with the model accounting for 30% of the variance, $R^{2}=.30, F(3,70)=10.17, p<.001$. Adding total parenting stress ($\beta=-.66, p<.001$) and HRQoL ($\beta=0.19, p=.003$) in the second step reduced the unique contribution of household labour hours ($\beta=-.19, p=.002$) and occupational gaps ($\beta=-.19, p=.01$) to overall QoL, with the final model accounting for 77% of the variance, $R^{2}=.77, F(7,66)=32.23, p<.001$.

For secondary caregivers, hierarchical multiple regression identified occupational gaps ($\beta=-.63, p<.001$) as a significant predictor of overall QoL, with the model accounting for 41% of the variance, $R^{2}=.41, F(2,51)=17.41, p<.001$. When total parenting stress ($\beta=-.48,$
Conclusions:

Despite differences in role responsibilities (e.g., employment, home duties), time pressure, and HRQoL between primary and secondary caregivers, access to meaningful activities was identified as important for QoL in all caregivers. When adding parenting stress and HRQoL to the model, the contribution of occupational gaps to QoL in primary caregivers reduced. However, for secondary caregivers occupational gaps no longer predicted QoL while also accounting for parenting stress and HRQoL. Further investigation into the interrelationships between these variables and QoL is needed to better understand how best to support both primary and secondary caregivers of autistic children in meeting occupational and QoL needs.

423.175 (Poster) Participatory Approaches in Autism Research: A Systematic Review
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Background:

Participatory research (PR) provides a framework for centering the voice of autism stakeholders in research, ensuring that research is relevant, and improving the efficacy of implementation (Fletcher-Watson et al., 2018). The use and appreciation of PR are growing across disciplines, yet, to our knowledge, there have been just two systematic reviews identifying participatory methods in autism research. Jivraj and colleagues (2014) identified seven studies using participatory methods. Of the seven, only two identified the participants as autistic. Yusuf and Elsabbach (2015) conducted a scoping review of participatory research in autism biomarker discovery. They found just one that had a participatory component to their research.

Objectives:

The aim of this review is (1) to provide an update on the current state of the literature, (2) to provide a review that is specifically focused on autism, and (3) to expand previous reviews to include a broad definition of the autism community.

Methods:

We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines to conduct a systematic review (Moher et al., 2015). The scope and purpose of this review were guided by a research advisory board consisting of three autistic adults. A librarian guided the search, including the selection of databases and refinement of search terms. The initial article search was conducted on December 4th, 2020, and updated on July 1st, 2022. Articles selected needed to (1) be published in a peer-reviewed journal before the year 2022, (2) be focused on autism, (3) have a direct mention of a key term related to PR, (4) be available in English, and (5) be original empirical research (e.g., qualitative or quantitative) and include a methods section. Articles focused on PR were excluded as they often blended the lines between empirical and methods and/or reported on the process of doing research of other articles that were included in the review. See figure 1 for an overview of the study search and selection process.

Results:

See table 1 for the articles identified and the full results. Of the 48 articles we identified, 24 had autistic people as their collaborators, 10 had other types of stakeholders (e.g., family members or service providers), and 14 had both autistic and non-autistic stakeholders as collaborators. The stakeholders contributed to various aspects of research, and in 37 of the studies, there was collaboration on multiple, specifically listed research activities. The majority of the studies were qualitative (n = 33). Although all articles specifically listed participatory methods, studies referred to a variety of specific participatory traditions, including community-based participatory research (n = 13), participatory action research (n = 7), and visual methods (n = 8).

Conclusions:

This study indicates that stakeholder engagement in autism research has been increasing over time and is influencing a variety of research topics. Participation in multiple areas of the research process suggests engagement beyond tokenism. Our inclusion criteria often excluded participatory design focused articles which is an important area for future research.

423.176 (Poster) Participatory Research on Support for Autistic Individuals and Their Family Members: Good Practices, Challenges and Success Factors
Background: The Academic Collaborative Centre for Autism (ACCA) is a collaborative network in Flanders (Belgium) funded by the Flemish government. Within ACCA, we perform participatory and practice-oriented research on support for autistic children, adolescents and adults and their family members. Autistic children and adults and their family members. Autistic individuals are part of the cross-project steering board, expert panels for the selection of projects and guidance committees for each project. We will present challenges and success factors within the different phases of research. Challenges are for example related to the question of representation, or tensions between autism community representatives and between representatives and researchers. Identified success factors over the past years include mutual respect, time and effort to build bridges, inclusive communication, and a flexible approach.

Conclusions: By conducting participatory research we try to ensure that our research is and remains relevant for autistic individuals. Although participatory research is an important endeavour in autism research, appropriate engagement of autistic individuals in all phases of research requires effort, evaluation and a continuous process of adaptation to improve participation.

423.177  (Poster) Perceived Support Needs of Young People on the Autism Spectrum and Their Caregivers

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Background: With an increasing number of young people on the autism spectrum requiring health, disability and education services, wait-times and expenditure have become problematic. Innovative approaches are needed to determine and provide necessary supports in a timely and cost-effective manner, enabling individuals to achieve their prioritized goals and maximize their quality of life.

Objectives: The aim of this study was to explore the perceived support needs of Australian young people on the spectrum and their caregiver(s).

Methods: Phenomenographic Support Needs Interviews were conducted by occupational therapists during home-visits with caregivers of 68 young people on the spectrum (5–17 years) living in four states of Australia. Caregivers were asked to identify and describe up to ten new (unmet) or existing (partially or fully met) support needs, before ranking these from most to least important. The interview summaries were de-identified before importing into NVivo for phenomenographic analysis using a seven step process.

Results:
Caregivers described a total of 403 support needs, averaging approximately six support needs each, where the recipient included the young person, caregivers and/or others. Almost all caregivers reported that at least one support need was being partially met and further support was required and two-fifths of the caregivers described at least one support need that was not currently being addressed at all. The most important support needs frequently spanned multiple aspects of functioning. Where the difficulty underlying these support needs could be attributed to a single aspect, this was most frequently Mental functions, Major life areas (especially school) or Interpersonal interactions or relationships. Qualitative data analysis resulted in two hierarchical outcome spaces, one each for young people and their caregivers, indicating interacting levels of support need areas that could be addressed through a combination of suggested supports. These support needs and suggested supports aligned with almost all chapters within the Body Functions, Activities and Participation and Environmental Factors domains of the International Classification of Functioning, Disability and Health. The overall goals of meeting these complex and interacting support needs were for the young people to optimize their functioning to reach their potential and caregivers to ensure the sustainability of their caregiving capacity. These support need areas most frequently related to difficulties with Mental functions, Learning and applying knowledge, Interpersonal interactions and relationships, Major life areas and Community, social and civic life. Suggested supports were most frequently associated with Support and relationships and Services, systems and policies.

Conclusions:

The caregivers who participated in this study described a vast array of complex and interacting support needs and suggested supports related to 68 Australian young people on the spectrum and their support people. A series of recommendations for support services, researchers and policy makers have been made to position support needs as central during the assessment, support and evaluation phases.

423.178 (Poster) Physical Activity Practices of Mothers and Fathers Caring for Autistic Children


Background: Many US adults do not meet physical activity (PA) guidelines, and those caring for children with disabilities may face additional barriers to PA. However, little is known about the physical activity practices of parents caring for children with an autism diagnosis.

Objectives: We aimed to describe the PA practices of mothers and fathers of autistic children, including the change in maternal PA upon entering a subsequent pregnancy. Additionally, we aimed to examine predictors of PA in this sample, including the proband child’s autism severity.

Methods: PA practices were collected as part of the Early Autism Risk Longitudinal Investigation (EARLI) study, which enrolled pregnant women who already had a child with autism (the proband child). Participants retrospectively reported their frequency and duration of walking/biking for transport, moderate intensity house/yard work, and vigorous intensity exercise. At enrollment (during early pregnancy), mothers reported their PA in the 3 months before the study pregnancy and fathers reported their PA in the 6 months before enrollment. At the 3-month postpartum visit, mothers reported their PA during pregnancy. Minutes per week of moderate and vigorous intensity PA were calculated and compared to Physical Activity Guidelines for Americans (150 mins/week of moderate intensity PA and, for non-pregnant adults, 75 mins/week of vigorous intensity PA). Sociodemographic variables were tested as predictors of each PA measure using simple linear regression and p<0.05. Variables included: household income, parity; maternal and paternal occupational activity level (sedentary to very active), perceived health status (poor to very good), age, education, race/ethnicity; proband’s autism trait severity, measured by the Social Responsiveness Scale; and, during pregnancy only, maternal diet quality, total energy intake, prenatal vitamin usage, and self-reported maternal depression.

Results: Mothers (pregnancy n=177, pre-pregnancy n=229) and fathers (n=135) reported similar levels of moderate intensity PA (median ~31 mins/week). However, levels of vigorous intensity PA varied across groups, with only 16% of mothers engaging in any vigorous intensity PA during pregnancy, compared to 54% in pre-pregnancy and 69% among fathers. Only 29% of mothers who were vigorously active in pre-pregnancy continued during pregnancy, despite recommendations to continue if vigorously active. Furthermore, only 7% of pregnant women met guidelines for minutes of PA per week, whereas 40% of non-pregnant women and 23% of men met guidelines. For all groups, the percent meeting guidelines was lower than published estimates from the US National Health and Nutrition Examination Survey. Income, parity, occupational activity category, age, education, and race/ethnicity were associated with at least one PA measure, but proband’s autism trait severity was not. Parental perceived health status was the only variable consistently associated with PA across groups, with those reporting better overall health also reporting more PA.

Conclusions: Few caregivers in this sample met US guidelines for PA, especially during pregnancy. Because PA contributes to parents’ physical and mental capacity for caregiving, further research is needed to understand barriers to PA (potentially including lack of
awareness regarding PA guidelines) and develop better supports to increase moderate and vigorous intensity PA among caregivers of autistic children.


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**Background:**

Individuals on the autism spectrum have atypical communication skills, social interactions, and repetitive behaviors and interests compared to those of their neurotypical peers according to the American Psychiatric Association (2013). This condition currently affects 1 out of 44 individuals in the United States, with each affected person expressing symptoms to varying degrees (Maenner et al., 2021). Autism can impact an individual’s social pragmatics, expressive and receptive language, and nonverbal communication cues. There is limited research regarding individuals on the autism spectrum who struggle with expressive language, and as such, the definitions are inconsistent, with descriptions ranging from no spoken language to those who can speak, but with speech patterns that are echolalic (Tager-Flusberg & Kasari, 2013).

In addition to the abovementioned diagnostic criteria for autism, individuals on the autism spectrum often have motor control concerns (Cavallo et al., 2021; Ming et al., 2007; Ozonoff et al., 2008) and sensory avoidance or seeking behaviors (DeBoth & Reynolds, 2017) that can impact their engagement in various physical activity settings (Blagrave, 2017; Blagrave et al., 2021; Colombo-Dougovito et al., 2021; Healy et al., 2013). Limited studies have explored the physical activity (PA) perceptions of children on the spectrum from the parent or caregiver perspective (Blagrave & Colombo-Dougovito, 2019; Kirby et al. 2015; Pan & Frey, 2006; Must et al., 2015), and to date, no studies have explored these experiences through the lens of those with minimal verbal expressive language skills and/or complex communication needs.

**Objectives:** Limited research has examined the experiences of children with ASD who have verbal expressive language, and no research to date has explored the physical activity (PA) preferences children and the autism spectrum with complex communication needs (CCN). This exploratory qualitative study aimed to understand the PA preferences of children on the autism spectrum with CCN, based on previous PA experiences and the PA experiences of these families.

**Methods:** A picture preference chart interview was utilized to capture the PA preferences child participants. Pictures were coded based on activity type to explore themes in preferences. Semi-structured interviews were conducted with the children’s parents to explore PA experiences for the family and coded using thematic analysis.

**Results:** Children on the autism spectrum with CCN were able to express preferences for certain physical activities. Preferences were triangulated with semi-structured parent interviews and parental perceived child preferences. Additional semi-structured parental interviews presented the following themes regarding PA participation for family engagement: (a) the importance of PA and exercise; (b) sensory experiences participating in PA and; (c) atypical struggles.

**Conclusions:** Children on the autism spectrum with CCN were able to convey PA preferences (as triangulated by parental reports), and their opinions should be incorporated when designing physical activity programs and physical education experiences. PA participation of families who have a child on the autism spectrum with CCN has unique challenges, and more support is needed to promote engagement and improve health outcomes for both these affected individuals and their families.

423.180 (Poster) Political Experiences and Barriers to Voting Among Autistic Adults in the United States

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**Background:** Political participation is an important and meaningful aspect of civic engagement for adults. Existing research suggests disabled persons do not participate in politics at the same rates as the general population, likely due to societal barriers and inaccessible participation structures (Argan et al., 2020). Effectively no research has examined specifically how autistic adults engage in politics, and limited research has considered political attitudes among autistic adults (Taylor et al., 2021). Interventions to improve and support political participation are likely to be most effective if they are tailored to specific barriers autistic adults face and specific policies they value.

**Objectives:** The present study sought to advance understanding of political participation among autistic adults in the United States by 1.) presenting descriptive information about voting history, political views, and policies autistic adults value most, and 2.) evaluating how autistic and non-autistic adults differ in barriers to voting, methods of engagement, and emotional experiences surrounding politics.
**Methods:** Participants included 276 autistic adults and 361 non-autistic adults (nationally representative United States sample). Autistic adults (46.4% cisgender men, 74.3% non-Hispanic white, \( M_{\text{age}} = 29 \) years) included those who reported having a diagnosis (n=214) and those who self-identified (n=62). Participants completed an online survey regarding political attitudes, barriers to voting, frequency of engagement methods, and affective experiences.

**Results:** The majority of autistic adults were registered to vote and identified themselves as part of the Democrat party and as very liberal (Table 1). On average, autistic adults strongly or very strongly supported policies that proposed 1.) increasing representation and access for disabled individuals, 2.) increasing spending for schools, teachers, and childcare, 3.) investing in fighting climate change, 4.) ensuring gender equality, 5.) Medicare for all Americans, 6.) ensuring rights and protection for LGBTQ+ people, 7.) background checks for all gun sales, and 8.) legalizing marijuana.

An independent \( t \)-test was conducted to examine group differences in barriers to voting (Table 2). Large and medium effect sizes were found with greater barriers for autistic adults due to mental health difficulties, fear of crowds, fear of leaving the house, and lack of/difficulties with transportation. These results suggest greater mental health support is needed for autistic adults in political processes.

Group differences in frequency of political engagement methods showed that autistic adults reported higher levels of engaging in these ways: through social media outlets (following \( p=.029, d=.175 \) and commenting \( p=.002, d=.252 \)) and signing a petition (\( p<.001, d=.287 \)). Autistic adults reported lower levels of engaging in these ways: watching political debates (\( p=.007, d=.214 \)), watching news (\( p=.010, d=.207 \)), and reading about politics in print newspapers (\( p=.003, d=.236 \)). When asked about the current political climate, autistic adults reported higher feelings of being upset (\( p<.001, d=.425 \)), hostile (\( p<.001, d=.388 \)), ashamed (\( p<.001, d=.391 \)), nervous (\( p<.001, d=.611 \)), and afraid (\( p<.001, d=.525 \)). They reported lower feelings of being determined (\( p=.01, d=.207 \)) attentive (\( p=.01, d=.208 \)), and active.

**Conclusions:** Results of this study suggest autistic adults face unique barriers to political participation and have unique experiences related to participation. Limitations and future directions will be discussed.

423.181 (Poster) Predictors of Change in Wellbeing and Mental Health in Parents of Autistic Pre-Schoolers  
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**Background:** Parents of autistic children report decreased wellbeing and elevated mental health difficulties compared to other parents. Previous studies have identified concurrent correlates of wellbeing and mental health, but few have investigated predictors of subsequent wellbeing and mental health, or of change over time, particularly among parents of young autistic children.

**Objectives:** We examined which among various child, parent, and family/socioeconomic factors predicted reliable change over time in self-reported mental health and wellbeing outcomes, amongst parents of autistic pre-schoolers.

**Methods:** Fifty-three autistic pre-schoolers aged 17 to 44 months (\( M = 35.44, SD = 6.31 \)) and their primary caregivers were assessed at three timepoints (T1-T3) approximately 5-months apart. A subset (n=18) of families were randomised immediately after their T2 assessment for additional parent-coaching ESDM (P-ESDM) sessions delivered between T2 and T3. Parent mental health (DASS-21) and wellbeing (WEMWBS) outcomes were analysed at all three timepoints, while all other parent (e.g., coping strategies), child (e.g., level of autistic traits), and family factors (e.g., resources, income) were from T1. To assess individual-level change, Reliable Change Index (RCI) \( z \)-scores were computed as indicators of psychometrically reliable change for DASS-21 and WEMWBS total scores between T1-T2 and T1-T3.

**Results:**

Pattern of Change in Wellbeing and Mental Health: There was no significant group mean-level change over time in WEMWBS total scores, nor in DASS-21 total scores. At each timepoint, parents reported lower levels of wellbeing and higher levels of mental health difficulties compared to normative data.
Change in Wellbeing: Children’s adaptive behaviour (VABS ABC) was a significant unique predictor (above and beyond mental health [DASS-21] and family resources [Clarke QRS]) of WEMWBS RCI scores from T1-T2. Parents’ participating in parent-coaching ESDM between T2 and T3 was a significant unique predictor (over DASS-21 and parents’ initial statement of their child [AFMSS]) of WEMWBS RCI scores from T1-T3.

Change in Mental Health: Children’s level of autistic traits (ADOS CSS), parents’ coping strategies (Brief COPE), and parents’ initial description of their child (AFMSS) significantly predicted DASS-21 RCI scores from T1-T2; however, none of the predictors made a significant unique contribution. Parents’ initial description of their child (AFMSS) was the only significantly predictor of DASS-21 RCI scores from T1-T2.

Conclusions:
A combination of parent- and child-related traits predicted short-term change in wellbeing and mental health, while parent-related factors alone predicted medium-term change in wellbeing and mental health.

423.182 (Poster) Predictors of Stress in Mothers of Preschool Children with Autism Spectrum Disorder
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Background: To this day, majority of interventional approaches for children with autism spectrum disorder (ASD) are oriented towards the child or its parent with the primary goal of adopting strategies for developing joint attention and communication skills. Still, these strategies are not meeting the needs of parents and psychological stress they are exposed to by raising a child with ASD. Since parental stress level is affected by a number of negative daily events, as well as many protective factors, it is extremely important that the expert helps the parent to identify both - daily stressors and appropriate types of support suited for the parent, his/her child and the whole family.

Objectives: This aim of this study was to explore the predictors of maternal stress in order to identify the best predictor among sociodemographic factors, coping styles, characteristics of the child, social support as well as characteristics of intervention.

Methods: The study included total of 80 mothers of preschool children with ASD. Parenting Stress Index, Fourth Edition Short Form (PSI-4-SF), COPE inventory and Sociodemographic inventory were administered to all participants.

Results: Research showed that 22% of mothers that have children with ASD perceive severe parental stress levels. Social support, characteristics of the child and avoidance coping strategies were found to be significant predictors of parental stress. Neither sociodemographic factors, intervention, problem-focused or emotional coping were found to have an effect on parental stress level.

Conclusions: Although there is strong tendency for professional support to be directed towards the child, the results of this research point that the role of experts is also to help parents identify sources of stress as well as direct the parents to appropriate forms of support with regard to the needs of the child, as well as the needs of the parents.

423.183 (Poster) Prevalence of Interactions with First Responders: Reports from Caregivers of Children Diagnosed with ASD Who Exhibit Challenging Behaviors
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Background: Children with autism spectrum disorder (ASD) are prone to challenging behavior that can escalate into behavioral crises requiring the involvement of first responders (e.g., police officers) to ensure safety or provide transportation for psychiatric or other medical care. Unfortunately, despite the need for help, parents that seek emergency services when managing challenging behavior report frustration with how first responders interact with them and respond to their child. Currently, there is a gap in the literature regarding how racial and/or ethnic status affects families of individuals with co-occurring developmental disorders use of emergency services to manage behavioral crisis situations.

Objectives: Study 1 examined whether caregivers report differential use of first responder services based on their child’s demographic characteristics (e.g., race/ethnicity, gender, etc.). Study 2 surveyed caregivers regarding their encounters with and attitudes towards calling first responders during behavioral crises.

Methods: For Study 1, researchers conducted a retrospective review of 579 patient health records of children who sought services for the assessment and treatment of challenging behavior. Researchers extracted data including demographic information and endorsement of contacting emergency services due to challenging behavior. For Study 2, we conducted a thematic analysis of caregiver descriptions.
regarding their encounters with first responders when managing their child’s challenging behavior during a behavioral crisis using responses on free-text questions. A total of 23 caregivers participated.

Results: Study 1 findings indicated 72 caregivers (12.4%) reported calling emergency services in the last 12 months. Families did not differ in emergency service utilization based on identified race. There was a difference in service utilization based on reported ethnicity, with families who identified as non-Hispanic/Latino more likely to report calling emergency services than those who identified as Hispanic/Latino. For Study 2, with respect to race, 63.6% of caregivers who identified their child as Black endorsed thinking about race when deciding how to manage their child’s challenging behavior whereas no respondents (0%) who identified their child as White endorsed thinking about race. Ten respondents (43.5%) endorsed a “bad” interaction with first responders. Families did not differ in endorsement of negative experiences with first responders per their racial identity. Thematic analyses identified four themes present in caregiver descriptions of their encounters with first responders when managing their child’s challenging behaviors: inexperience with autism, physical restraint, poor communication, and de-escalation strategies.

Conclusions: Exploratory results from both studies indicate families from racial/ethnic minority groups experience barriers to seeking first responder assistance. Although most interactions between first responders and community members are positive, families of children with ASD frequently indicate frustration with the outcome of their attempts to seek assistance with behavioral crises. When this frustration leads to hesitancy to seek help from first responders, the burden already experienced by families of children with ASD who engage in challenging behavior is compounded. Negative interactions between caregivers and first responders, or parent perceptions that these encounters will be negative, are a social determinant of health because they diminish willingness to seek assistance, creating disparities in access to needed medical and mental health services.

423.184 (Poster) Priorities for Intervention: Perspectives of Parents of Preschool Children with Autism in Bosnia and Herzegovina

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Background: Parents of children with autism spectrum disorder are involved in creating Individualized Education Programs for their children. Together with other professionals (teachers, psychologists, and special education teachers), they decide on the most urgent developmental areas that need intervention.

Objectives: The present study aims to examine what parents of preschool children with ASD in Bosnia and Herzegovina believe are the most important priorities for intervention.

Methods: We used a survey to examine the perspectives of parents of children with ASD about intervention priorities. The survey asks how much of a priority the intervention is in various developmental fields, such as communication, social skills, behavior, motor skills, and self-care. A total of 60 parents of preschool children with autism completed the survey.

Results: The results indicate that the highest priorities for parents are in the domain of communication skills. More specifically, the top six priorities were: 1. expressing interests and wishes, 2. following instructions, 3. communicating with others, 4. naming objects, 5. initiating conversation, and 6. responding appropriately to questions. Other intervention priorities in the top-10 list were playing with peers, initiating interactions, toileting, and feeding.

Conclusions: Given that communication deficits are one of the hallmarks of autism, it is not surprising that parents consider intervention in the communication domain the most important for their children. This information is important for the stakeholders and professionals working in the field, as it can help tailor interventions that are aligned with parental priorities.

423.185 (Poster) Promoting Meaningful Collaboration between Autism Researchers and the Autistic Community: An Example from the Campus Belonging Network


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Background: Autistic advocates have expressed frustration with the lack of community engagement in autism research (den Houting, 2021). At the same time, autistic advocates feel they would benefit from training in the underlying philosophies of participatory research (Pickard et al., 2020). The Campus Belonging Network uses a community-based participatory research (CBPR) approach to explore the experiences of autistic postsecondary (PS) students in Canada to ensure our research was inclusive, transparent, and focused on improving...
quality-of-life as defined by autistics (Pellicano et al., 2014). Autistic Community Partners (ACPs) with lived experience within PS contexts informed research design and methods.

**Objectives:** To capture ACP perspectives on the impacts of engaging as co-researchers in exploring how to build the capacity of PS institutions to foster belonging for all autistic members of our campuses.

**Methods:** Four ACPs (aged 27-46), including Indigenous and queer participants, completed survey questions that focused on what they hoped to gain from being an ACP. ACPs then completed training in research processes (Research 101 Training), research ethics, and qualitative interviewing. For six months, ACPs participated in monthly virtual meetings. They provided feedback on research design and materials in partnership with autistic researchers from the project’s steering committee. As the project ended, ACPs reflected upon what they gained from participating as co-researchers in our project.

**Results:** Their feedback revealed two main themes: enhanced knowledge/skills and well-being. Enhanced knowledge/skills. Our ACPs reported they gained more understanding of the research process and felt more confident to be co-researchers in the future. They also reported benefiting from exposure to new and differing perspectives. Lastly, they all indicated a strengthened desire to pursue higher education or future career paths related to research. Enhanced Well-being. ACPs all experienced increased well-being from participating in the project. All described benefiting from the sense of community that emerged within this autistic group, which one ACP called “a safe place to be”. Having their contributions valued and their recommendations enacted also allowed ACPs to see their own gifts more clearly and feel more confident in their abilities. ACPs likewise reported increased well-being because they believed they were making a difference. For example, one ACP said she “gained a sense of fulfillment from contributing to something important to both academia and society as a whole”.

**Conclusions:** Including ACPs in our study benefited both ACPs and overall project quality. ACPs reported learning new knowledge and skills and increased well-being. Our commitment to providing opportunities for ACPs to gain new competencies and professional skills moved this project beyond participatory research and into emancipatory research, wherein the participatory experience generates new transferable skills for the former layperson (Chown et al., 2017). In sum, amplifying autistic perspectives within our project empowered ACPs personally and professionally while also improving the overall quality, relevance and impact of our research to enhance autistic PS students’ sense of belonging within Canadian PS institutions.

**423.186 (Poster) Psychiatric Diagnoses of Parents and Siblings of Children with Autism Spectrum Disorder (ASD) in Specialized Inpatient Units and Their Relationship to Problem Behaviors**

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Background: Several studies have examined psychiatric diagnoses of parents and siblings of children with autism spectrum disorder (ASD). However, there is little research examining psychiatric diagnoses of parents and siblings of children with profound autism and severe challenging behavior, such as those who are hospitalized in specialized inpatient units. The relationship of parent psychiatric diagnoses to their child’s problem behaviors is also unclear.

**Objectives:** To describe psychiatric diagnoses of parents, and full- and half-siblings of children with ASD hospitalized in specialized inpatient units. To examine the relationship between parent psychiatric diagnoses and child problem behaviors.

**Methods:** Data from 1014 hospitalized children and adolescents with an Autism Diagnostic Observation Schedule-2 confirmed ASD diagnosis from the Autism Inpatient Collection (AIC), and data from a biological parent, were analyzed. The AIC is a multi-site study of patients hospitalized in inpatient units specialized for the psychiatric treatment of children with ASD and other neurodevelopmental disorders. Parents provided information regarding their own psychiatric diagnoses, and those of any full- and half-siblings, as well as parent-rated behavioral measures for their child with ASD upon admission. Data was collected on the following psychiatric diagnoses: anxiety, depression, post-traumatic stress disorder (PTSD), obsessive compulsive disorder (OCD), attention deficit hyperactivity disorder (ADHD), conduct disorder, oppositional defiant disorder (ODD), ASD, intellectual disability (ID), Tourette’s, learning disorders (LD), psychosis, bipolar disorder, and schizophrenia. Descriptive statistics, including means and standard deviations for continuous variables and proportions for categorical variables, were computed. Multiple regression analysis was conducted to examine the relationship between psychiatric diagnoses and child problem behaviors.

**Results:** The most common psychiatric diagnoses for mothers were anxiety (44%) and depression (43%); for fathers it was depression (18%) followed by anxiety (15%); and ADHD (14%) and ASD (14%) for full-siblings, and half-siblings 14% and 6% respectively (Figure 1). Only 1% of mothers and 2% of father’s reported an ASD diagnosis in our sample. Mothers with versus those without anxiety ($M=28.8\pm9.9$, vs $26.5\pm9.7$, $p=.02$), depression ($M=28.4\pm8.8$ vs $26.3\pm9.8$, $p=.04$), ADHD ($M=29.5\pm9.5$ vs $27.2\pm9.3$, $p=.05$) or bipolar disorder ($M=30.3\pm9.6$ vs $27.5\pm8.4$, $p=.03$), had children with significantly higher problem behavior scores. Fathers with versus those without ID ($M=33.7\pm7.2$, vs $27.4\pm9.2$, $p=.05$), or conduct disorder ($M=34.1\pm3.9$, vs $25.8\pm4.5$, $p<.001$), had children with significantly
higher problem behavior scores. Interestingly, fathers with OCD (M=26.3±8.7, p=.02), had children with significantly lower problem behavior scores than fathers without OCD (M=30.6±8.8). See Table 1 for descriptive statistics for the complete sample.

Conclusions: Children with ASD who have mothers with self-reported anxiety, depression, bipolar disorder, or ADHD, and fathers with self-reported ID, or conduct disorder, have significantly higher problem behaviors in our sample. Both mothers and fathers reported anxiety and depression as their most common psychiatric diagnoses, indicating the need for interventions to reduce anxiety and depression in both mothers and fathers with a child with ASD who are psychiatrically hospitalized. Further exploration into how parents’ psychiatric diagnoses may relate to their child’s problem behaviors as well as the potentially protective effects of OCD in fathers requires further investigation.

423.187 (Poster) Psychological Wellbeing in Parents: A Comparison in Relation to Their Infant to Adult Children with Autism, Cerebral Palsy, and Neurotypicality

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Background: Considering the many joys of parenthood, raising a child can also be fairly demanding. While parents of neurotypical children may experience their parenthood as challenging, it has been found that, in comparison, parents of a child with a developmental disorder, such as autism, experience poorer mental health and psychological well-being (Scherer et al., 2019). This may be related to their increased caregiver burden due to, for example, additional financial costs (Oh & Lee, 2009), decreased employment and social isolation (Currie & Szabo, 2021), concerns about the future (Auerbach et al., 2019), and challenging behavior of the child (e.g. aggression, hyperactivity, defiance; Jones et al., 2014).

Objectives: The current study aims to investigate the psychological wellbeing of parents of autistic children (i.e. a cognitive developmental disorder), in comparison to parents of children with cerebral palsy (i.e. a physical developmental disorder), or neurotypical children. In addition, personal and social factors contributing to parents’ general psychological wellbeing were identified.

Methods: The data was collected via an online survey, from N=187 parents (94.7% mothers, 17 different nationalities, M_age=35.16; SD_age=7.44), of which n=49 had an autistic child, n=28 had a child with cerebral palsy, and n=110 had a neurotypical child. Children were aged between 2 months and 41 years (M_age=5.65; SD_age=6.40), 110 were male, 76 were female, and one identified their child as diverse. Parents reported general socio-demographic data, as well as several mental health assessments. These included the WHO-5 Well-being Index (World Health Organization, 1998), the Major Depression Inventory (MDI; Cuijpers et al., 2007), the Zung Self-Rating Anxiety Scale (SAS; Zung, 1971), the Parental Stress Scale (PSS; Berry & Jones, 1995), the Brief-COPE questionnaire (Carver, 1997), the Brief Resilience Scale (BRS; Smith et al., 2008), and an adapted version of the Care Dependency Scale (CDS; Dijkstra et al., 1998).

Results: The results of multivariate analyses of variance indicated a significant group difference in the five outcome variables (i.e. anxiety, stress, depression, resilience, and general wellbeing) based on the children’s diagnosis, F(4, 182)=2.68, p=.004, η^2=.07. Separate analyses of variance on the outcome variables suggested significant diagnosis-effects for anxiety F(2,184)=3.82, p=.024, η^2=.04 and resilience F(2,184)=3.50, p=.032, η^2=.04. Parents of autistic children and children with cerebral palsy each experienced significantly more anxiety, and parents of autistic children were significantly less resilient than parents of neurotypical children or children with cerebral palsy. Using a multiple linear regression analysis, we found that certain parent-characteristics (i.e. depression scores, stress scores, and income satisfaction) as well as the child’s age, were predictors of the parents’ general well-being (Table 1).

Conclusions: This study supports previous research finding that parents of children with cerebral palsy and autism each experience poorer psychological wellbeing than parents of neurotypical children. In general, however, a child’s diagnosis was not found to significantly predict their parents’ psychological wellbeing. These results bring further knowledge into the specific demands parents of autistic and other neurodivergent children may experience in comparison to parents of neurotypical peers, and how their psychological wellbeing can be catered for and supported more specifically.

423.188 (Poster) Public Health Implications of the Accuracy of Informational Videos about Autism on Tiktok


Background: The internet is the most common source of information about autism spectrum disorder (ASD) for parents, with 93.9% having accessed the internet as a source in a 12-month period (Lindly et al., 2022). Although the internet, and social media in particular, have made information about ASD readily accessible to the general public, concerns have been raised about the unfiltered nature of the content. TikTok is a popular short video format social media platform boasting over one billion active users in 2021. Although the app is designed for entertainment, it has grown to include videos intended to be informational. The #Autism hashtag on TikTok has accrued 11.5 billion views as of September 2022. Concerns related to ASD content on this platform include the possibility that video creators may
sensationalize content to attract viewers at the expense of accuracy. It is imperative to analyze the accuracy of information on TikTok and identify misleading information. To our knowledge, no studies have reviewed the accuracy of ASD content on TikTok.

**Objectives:** This exploratory study seeks to be the first to evaluate the accuracy of TikTok videos that are designed to disseminate information about ASD.

**Methods:** Videos were sourced from the #Autism hashtag. This hashtag is approximately sorted by video views. Informational videos (n=133) were defined as videos designed to share information about ASD generally (for example, videos that include statements about an intervention or diagnostic tool beneficial to the ASD population), as opposed to an individual’s personal experience. Videos that did not specifically mention or relate to ASD or were not in English were excluded from analysis. Videos were then coded as either accurate or inaccurate based on their consistency with existing literature; any overgeneralization was coded as inaccurate. Two coders independently coded videos as either accurate or inaccurate with intercoder reliability at 80.1%. Discrepancies were resolved by a third coder. Additional data were collected on the videos’ views and likes, whether the video creators disclosed a diagnosis of ASD (ASDC) and creators’ status as healthcare professionals (HCP).

**Results:** Ninety-five (71.4%) of the videos were from ASDCs, seven (5.26%) were from HCPs, and thirty-one (23.3%) were from creators that did not identify themselves as ASDCs or HCPs. 72.9% of the analyzed videos were classified as inaccurate. Videos posted by HCPs were more likely to be accurate (X^2 (1, N = 133) = 7.4, p = .007). Videos classified as being inaccurate totaled 144,584,203 views and 16,724,125 likes, while those classified as being accurate totaled 54,111,743 views and 8,468,277 likes. There were no significant differences in mean views and likes for accurate versus inaccurate videos.

**Conclusions:** Although TikTok is a prominent source of information about ASD, most of the informational content on the platform appears to be inconsistent with existing research. Misunderstanding of ASD is a public health problem and may impact how families, professionals, stakeholders, and autistic individuals relate to evidence-based services and supports. Awareness of information and misinformation spread through social media is critical for professionals to better serve the autism community.

423.189 (Poster) Quality of Life in Parents of Children with Autism in Singapore: Examining the Role of Courtesy Stigma, Affiliate Stigma and Psychosocial Variables Using the Double ABCX Model of Adaptation

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**Background:**

Caregiving for a child with autism can be a challenging experience for parents. In addition to the physical demands of caregiving, studies have shown that parents of children with autism can be negatively affected by the stigma of having a child with autism. Courtesy stigma refers to the prejudices, stereotypes and discriminatory behaviour that may be perceived by parents of children with autism, for their close association to their child with autism. An internalisation of courtesy stigma can lead to affiliate stigma, whereby these parents develop negative self-evaluation and negative emotions towards themselves.

Much of caregiving research investigated how various sources of stress and psychosocial factors interact and shape caregiver outcomes. However, courtesy stigma and affiliate stigma, has yet to be examined alongside other psychosocial factors.

**Objectives:** This study used the McCubbin & Patterson (1983)’s Double ABCX model of Adaptation to explore the interplay of courtesy stigma, affiliate stigma, with other psychosocial variables, namely caregiving demands, social support and active avoidant coping, in influencing quality of life (QOL) among parents of children with autism.

**Methods:** Parents of children with autism aged between 3 to 18 years old were invited to participate in an anonymous online survey. The survey consisted of six questionnaires on caregiving demands, courtesy stigma, social support from significant others, family and friends, use of avoidant coping strategy, affiliate stigma and QOL. Data on the parents’ socio-demographic characteristics and child’s level of need was also be collected. Mediation and moderation effects were examined using Multiple Regression Analysis.

**Results:** A total of 111 parents (88.3% mothers) completed the survey. All variables were found to be significantly correlated with one another (r=−.22-.64, p<.05). Results from regression analysis found that in the relationship between caregiving demands and parent QOL, active avoidant coping was a partial mediator, and social support from significant others and family, not from friends, were moderators. Results also found that in the relationship between courtesy stigma and parent QOL, affiliate stigma was a full mediator, although social support from significant others, family, and friends were not significant moderators.

**Conclusions:**
Typical caregiving arrangements for individuals with autism are usually kept tightly within the immediate family circle, hence it is not surprising that social support from significant others and family but not friends, were significant moderators of the relationship between caregiving demands and parent QOL. The hypothesized moderation effects of social support from significant others, family and friends, between courtesy stigma and parent QOL was unsupported. It is possible that courtesy stigma may be widely prevalent at the community and societal level, such that even a strong social support system may be unable to buffer its negative impact on parents.

Increasing social support from significant others and family can help ease the caregiving burden experienced by individual caregivers and improve the caregivers QOL. There is a need for further community and societal efforts to reduce the stigma surrounding individuals with autism and their families, so as to building a more supportive social context for these parents and their children.

423.190  (Poster) Quality of Mother-Child Interaction in Dyads with an Autistic Children: How Different from Normative Dyads? Preliminary Results from a Prospective Cohort in Canada.


Background:

Autism is no longer considered a rare condition with a prevalence of 1%. Autism is characterized by challenges in social interaction and communication, restricted interests and repetitive behaviors present since early childhood. These particularities in social interaction and communication are likely to influence the nature and quality of parent-child interactions. While more interventions focus on supporting and teaching parents strategies to promote child socio-emotional development and well-being, the need to better understand relationship quality between a parent and their autistic children is essential. However, few studies have observed the parent-autistic child interaction and the determinants of this relationship.

Objectives:

To further our understanding of the mother-autistic child relationship, the current study compared the quality of mother-autistic child interaction with that of mothers with their neurotypical child on several relationship dimensions (e.g. dyad coordination, the tension in the interaction, maternal sensitivity).

Methods:

Sixty-one (N=61) mother-child dyads participated in this study (n= 33 dyads including an autistic child, M-AC dyads; and n=28 dyads of mothers and their neurotypical children, M-NC dyads). The mothers were between 26 years old and 46 (mean = 3.48; sd = 4.94), and the children were between 2 and 6 years old (mean = 4.45; sd = 1.32). The quality of mother-child interactions was assessed by a behavior observation of a 10-minute video session using the Dyadic Interaction Grid. It includes eight 7-point subscales and a global quality score: coordination (1), communication (2), role (3), emotional expression (4), maternal sensitivity – appropriate responding (5), tension – relaxation (6), mood (7) and pleasure (8).

Results:

Preliminary results suggest that M-AC dyads global quality of interaction (mean = 3.91; sd = 1.47) is significantly different than M-NC dyads global interaction quality (mean = 5.21; sd = 1.07; t(59) = 3.91, p < .001). In addition, every components of the interaction (e.g. coordination, pleasure, maternal sensitivity, etc..) is different among M-AC dyads in comparison with M-NC dyads.

Conclusions:

The M-AC dyads' global social-affective quality of interaction is significantly different than the normative dyads, which implies challenges for both the mother and the autistic child to maintain a good, coordinated, communicative and pleasurable relationship. The present study demonstrates the need to better identify the factors associated with the quality of parent-autistic child interaction. These potentially influencing factors could represent targets for complementary intervention supporting the child's optimal development and, at the same time, facilitating daily family relations.

423.191  (Poster) Barriers to Providing Quality Transition Supports to Autistic Students
Background: In the United States, the Individuals with Disabilities Education Act (IDEA, 2004) requires implementation of school-based transition planning to prepare students with disabilities for adulthood. Since this legislation was passed, researchers have recommended particular components of transition planning to promote autistic youths’ successful transition from high school to adulthood. These components include focusing on students’ strengths, needs, and goals for adulthood; developing relevant skills (e.g., self-determination); fostering career-related experiences; and providing access to support systems (Lee & Carter, 2012; Wehman et al., 2014). Even with such recommendations, several issues remain. First, it is unclear whether school professionals attempt to enact appropriate transition supports. Second, barriers may make it challenging for school professionals to implement quality transition supports. Both issues could contribute to disengagement of autistic youth following high school (Shattuck et al., 2012). Previous studies have gathered perspectives of key stakeholders (e.g., health care professionals) regarding barriers that limit successful transition to adulthood (Kuo et al., 2018; Snell-Rood et al., 2020); however, these studies did not specifically address school-related barriers.

Objectives: To examine barriers school professionals report make it difficult to prepare transition-age autistic youth for adulthood.

Methods: Participants had to have a role as special educator, transition specialist, school psychologist, or other school professional, and work directly with at least one transition-age (14-22 year-old) autistic student. Participants completed an open-ended online survey which was developed based on Kohler’s Taxonomy for Transition Planning 2.0 (Kohler et al., 2016) and included questions about the transition supports they provided autistic transition-age youth and barriers that made it difficult to provide transition supports. Here, we focused on the barriers identified by participants. NVivo software was used to organize and code participant responses. Two coders used qualitative content analysis to inductively identify categories (e.g., autistic youth, familial) and themes (i.e., transition supports and barriers) (Hsieh & Shannon, 2005).

Results: Twenty-one school professionals completed the survey. All participants identified as White women in a variety of roles (see Table 1 for additional participant characteristics). Barriers described by participants pertained to autistic students, their families, the classroom and school context, and community. Table 2 provides descriptions of each barrier category with transcript extracts that illustrate each category. Most of the participants perceived deficits of autistic students and their families as barriers to providing transition-related services. In contrast, a few participants understood barriers to providing transition supports as issues beyond the autistic youth and their families, such as school professionals’ own lack of knowledge regarding transition services.

Conclusions: Barriers to providing transition-related support were framed as stemming from autistic students and their families, consistent with deficit ideologies (Gorski, 2011). We recommend teacher preparation programs and professional development trainings create spaces that promote a social model understanding of disability, so that insufficient accommodation, and not student and family deficits, are viewed as the source of barriers to service provision. Furthermore, school professionals should receive autism-specific training that focuses on transition-related resources and supports to provide autistic transition-age youth.

Background: Parents of autistic children report that their children’s primary care physicians (PCPs) are “not good” at addressing autism-specific needs, and PCPs themselves report a lack of self-perceived confidence and need for greater education about autism. Latino families of autistic children report even greater barriers than white families in accessing high-quality, family-centered healthcare for their autistic children. There is a dearth of research, however, focusing on environmentally-related factors influencing the healthcare experience. As recognized by the International Classification of Functioning, Disability, and Health (ICF), environmental factors (e.g., physical, social, attitudinal, and political environments in which people live and conduct their lives) have the potential to facilitate or constrain function. Understanding the environmental barriers and facilitators impacting the healthcare experiences of Latino families of autistic children has the potential to reduce these documented healthcare disparities.

Objectives: The purpose of this study was to understand the environmental barriers and facilitators impacting the healthcare experiences of bilingual Latino families of autistic children in Los Angeles County.

Methods: This study utilizes a subsample obtained from a 12-month ethnography carried out in two phases. Phase 1: Two audio-recorded interviews were conducted with 12 families to understand experiences obtaining an autism diagnosis and services for children. Six of these families were then recruited using heterogeneity sampling to continue to Phase 2: Narrative interviews and observation in home, clinic, school, and community contexts. Children’s health records provided data triangulation. For this study, we identified healthcare stories using NVivo 10 software and a narrative analytic approach, resulting in a subcorpus of 10 interviews, 2 observations of PCP visits, and 2
Results: Common environmental barriers impacting families’ healthcare experiences were found in ICF categories Support and Relationships (e.g., lack of perceived support from PCP); Attitudes (e.g., perceived negative attitudes of PCP towards autism, PCPs not taking health-related reports of child symptoms seriously); and Education and Training (e.g., lack of adequate autism-specific training for PCPs). Most parents viewed their child’s PCP as helpful for dealing with the child’s physical illnesses but “hands off” in addressing the child’s autism-specific symptoms and developmental and behavioral challenges. All parents reported that they learned about autism resources without support from their PCP. Environmental facilitators included Support and Relationships and Attitudes (e.g., PCPs who were open to learning about autism and acknowledged parental expertise).

Conclusions: Findings suggest that the perceived “hands off” nature of PCPs in addressing the child’s autism-related developmental and behavioral challenges may be perceived by Latino parents as a lack of support and failure to provide expected guidance, and could negatively impact parent-provider trust and communication. PCPs might better meet families’ needs for support and education by engaging with and educating parents about the safety and efficacy of a wider range of autism treatments. These findings have implications for both PCP and parent education.

423.193 (Poster) Research 101 Training Development: A Participatory Process with Autistic Adults

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Background:

Autistic people have been advocating for inclusion in research as collaborators or co-researchers to enhance the relevance of autism research, support the self-determination of autistic individuals, and improve their quality of life. Yet, autism researchers continue to be reluctant to engage the Autistic community in research. One potential way to mitigate that reluctance is to provide training for Autistic people on research processes and collaboration.

Objectives:

To co-develop open-access Research 101 training to increase Autistic adults’ knowledge of the research processes and skills for collaboration to effectively engage in participatory autism research.

Methods:

The Research 101 training course was initially co-developed by an autistic and a non-autistic researcher based on information gathered from a marketing-style survey. This first version was piloted with six Autistic adults who had varying experiences with participatory autism research. Feedback was collected from the participants form using Likert scales and open-ended questions, and changes were made to the training based on the evaluations. The revised training was then piloted with three groups of Autistic adults (n=17); two groups were already involved in research as Autistic Community Partners and one group was comprised of Autistic adults who were not yet involved in research. The training was led by an autistic researcher and consisted of three, 2-hour, synchronous online sessions. Session topics include: Introduction, Being a collaborator, Getting to the research question, Answering the research question, Practical details, and Outcomes, publications, and implementation. Research participants were interviewed individually (n=10) or in a group (n=4) about perceived strengths and weaknesses, and recommended adjustments or criteria for the training. Interviews were audio-recorded and transcribed verbatim. Data analyses, guided by Braun and Clarke’s six-stage approach to thematic analysis, involved an iterative process of coding and theme development. These themes and sub-themes were then reviewed and refined with the assistance of Autistic Community Partners (n=5).

Results:

Three themes were identified. The first theme concerned edits to the existing training which will be reflected in the PowerPoint presentation with items related to content changes, order changes, physical presentation, and activity changes. The second theme was optional adaptations to tailor training for different individuals and groups and included optional training, tailoring logistics such as breaks, session length, and whether activities are done in whole or small groups. These will be outlined in the manual. The third theme was the importance of opportunities for connectivit and included having an autistic trainer, check-ins during the session, and ‘get to know you’ activities. Overall, the trainees appreciated that the training was developed specifically for autistic people and delivered by an autistic person. Additionally, trainees identified that their ability to collaborate in autism research would be impacted by the non-autistic researchers’ attitudes.
Research 101 training focused on research processes and skills for collaboration has been created as an open-access resource that will be hosted by the University of Edinburgh. This training could increase the capacity of Autistic adults to contribute to research as collaborators and increase autism researchers’ willingness to conduct participatory autism research.

**423.194 (Poster) Resiliency to COVID-19-Related Challenges in Preschool-Aged Children with Autism Spectrum Disorder**


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**Background:** The COVID-19 pandemic had numerous negative effects on children. Some children were able to recover from these challenges more easily than others. A deeper understanding of this phenomenon, also known as resiliency, may suggest ways to improve child outcomes.

**Objectives:** This study modeled the relationship of child, family, and social characteristics on resiliency in children during the COVID-19 pandemic. Given the increased challenges posed to children with ASD, we hypothesized children with ASD would show reduced resiliency compared to children without ASD.

**Methods:** The Study to Explore Early Development (SEED) is a multi-site case-control study of children aged 2-5 years with ASD conducted during 2007-2020. Children were classified as having ASD using standard diagnostic measures; children in the population control group were randomly selected from birth records. Mothers completed questionnaires on developmental and behavioral problems, demographics and their own mental health conditions. During January-June 2021, a questionnaire measuring the impact of the pandemic was collected (N = 641). We created a sum score of child resiliency as our outcome measure, with one point assigned to each of the following factors demonstrating improvement or no change: 1) sleep habits; 2) physical activity habits; 3) diet; 4) anxiety; 5) sadness/depression; 6) communication abilities; 7) time spent with extended family, virtually, or 8) in person; and 9) time spent with friends virtually, or 10) in person. We used a multi-step forward selection process to exclude unrelated independent variables from the following list of factors: child demographics, child developmental characteristics (e.g., ASD status, ASD symptoms, early learning abilities, and behavioral problems), maternal demographics, family income and parent’s reduced work, maternal mental health conditions, maternal health promotion practices, and child having a positive response to being able to spend more time with family. A Tobit regression was used to model the impact of the remaining independent variables on child resiliency with all independent variables entered as fixed factors.

**Results:** ASD case status was not associated with child resiliency. Resiliency was negatively associated with maternal anxiety and depression, in addition to child behavioral problems and delayed early learning abilities. Maternal Asian/Pacific Islander and Native American race/ethnicity also were negatively associated with resiliency, although cell sizes for these groups were small and therefore estimates were imprecise. Child having a positive response to the ability to spend more with their family was positively associated with resiliency. There was an interaction between loss of work and family income level. For the middle-income group, resiliency was higher when work was maintained but decreased when work was limited. The lower- and higher-income groups had similar resiliency regardless of work status.

**Conclusions:** Child resiliency is a complex phenomenon. Further research is needed to understand how to address factors negatively associated with child resiliency and promote factors positively associated with child resiliency. Focusing on maternal mental health may be important to mitigate barriers to resiliency in all children, as well as developmental characteristics among children with behavior problems or lower learning abilities.

**423.195 (Poster) Resisting Ableism and Affirming Neurodiversity: First-Person Perspectives on the Power of Student-Teacher Interactions**


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**Background:** Strong relationships and a sense of belonging in school are crucial to students’ well-being (Maciver et al., 2019). However, many autistic students (Mueller, 2021) and their teachers (Hodge et al., 2019) describe the school context as ableist, marginalizing, or
Objectives: To examine student-teacher interactions as a space of resistance and neurodiversity affirmation, drawing from teachers’ and autistic students’ perspectives on resisting ableism in schools.

Methods: We conducted interviews with autistic individuals (N=10; 40% current high schoolers; ages 15-35; 40% people of color; 40%/20% women/non-binary) and focus groups with teachers of autistic students (N=18; grades K-3; 72% with Master’s; 72% white; 94% women) in the U.S. Using a critical constructivist qualitative approach informed by grounded theory, we coded interviews inductively. Focus groups were coded deductively to determine whether teacher responses evidenced similar themes.

Results: Both teachers and students described student-teacher interactions that embodied resistance. These positive encounters in the classroom included intentional efforts by teachers and students to disrupt ableism in school norms, practices, and policies. In the context of marginalizing school structures, and other student-teacher interactions that perpetuated this marginalization, positive student-teacher interactions reflected several themes, italicized below.

Autistic students reported that positive student-teacher interactions empowered them to engage in self-advocacy through accepted routes (e.g., sharing their needs at IEP meetings; staying in touch with supportive school staff). Students also challenged neurotypical expectations in ways that risked further punishment or stigma (e.g., not complying with ableist policies; speaking out about overlooked needs); their comfort in challenging these expectations with some teachers was at times fostered by their strong connections with other teachers. Likewise, within these positive relationships, teachers actively challenged neurotypical expectations for behavior (e.g., “We all fall into [this trap of] wanting our kids to sit on the carpet nicely. [But] I have students that don’t conform to those [behaviors]. We have to be open to their needs in allowing them to do what they need”). Teachers pushed back against deficit-based views of autistic students, in favor of embracing students’ strengths and autism characteristics. Teachers resisted ableist structures and school practices (e.g., rejecting state-mandated grade-level standards by giving students alternative ways to demonstrate skills; breaking the no-students-inside-during-recess rule to enable preferred peer interactions). Further, teachers subverted school structures in favor of student mental health (e.g., “she [found a way around the attendance requirement and] would let me come in during lunch... instead of having to sit in the cafeteria which was a goddamn nightmare”).

Conclusions: Results highlighted the presence of individual and collective resistance to ableism through student-teacher interactions. This resistance occurred in the context of systemic ableism in schools and carceral practices in regulating student behavior (Annamma et al., 2019; Lalvani et al., 2015). Findings elucidated the potential for teachers and students to challenge and dismantle ableist structures in schools through activism engagement (Hodge et al., 2019).

Background: The COVID-19 pandemic has disproportionately increased the number of stressors experienced by autistic families (e.g., financial instability and social disruptions) and recent research has suggested that this has negatively affected caregiver mental health, family functioning, and children’s well-being (Calvano et al., 2021; Lee et al., 2021; Wade et al., 2021). Guided by the Family Stress Model (Conger et al., 1994) we used a newly developed COVID-19 Family Stressors Scale (CoFaSS, Prime et al., 2021) to measure the impact of pandemic-related psychosocial stressors and tested its effectiveness in screening for mental health concerns in service-seeking caregivers of autistic children.

Objectives: This study used receiver operating characteristic (ROC) curves to analyze the clinical sensitivity and specificity of the CoFaSS in screening for mental health concerns as experienced by service-seeking caregivers of autistic children.

Methods: 213 (Meanage = 39.91, SDage .75, 91% Female) service-seeking caregivers of autistic children who self-referred to the Autism Ontario Services Navigator Program participated in the study. Caregivers completed online surveys including demographics, a brief standardized depression and anxiety scale (K6, Kessler et al., 2002) and the CoFaSS (Prime et al., 2021).

A confirmatory factor analysis was done to examine the factor structure of the CoFaSS scale by subjecting 16 items from the original CoFaSS (Prime et al., 2021) to a three-factor model. Reliability of each CoFaSS scale was examined with Cronbach’s alpha. An ROC curve analysis was used to determine the ability of the CoFaSS to discriminate between the presence vs. absence of clinical levels of caregiver psychological distress and to choose the optimal cut-off point of the CoFaSS. The area under the curve (AUC) statistic was used as a measure of the overall performance of the CoFaSS and to determine the optimal cut-off point on the CoFaSS, we used sensitivity of at least 80% at the expense of specificity.
**Results:** The internal consistency was good for Income Stress (5 items, \( \alpha = .82 \)) and Family Stress scales (7 items, \( \alpha = .79 \)). There were significant associations between the Income Stress and Family Stress subscales (rs = .29, p < .001). The AUC was .74; with a moderate level of accuracy in identifying caregivers with clinical levels of psychological distress. Using a cut-off on the CoFaSS of 29.5 (participants classified as ‘positive’ if greater than or equal to 29.5), the sensitivity and 1-specificity of the test were 82% (true positives) and 44% (false positives), respectively.

**Conclusions:** Results indicate that the CoFaSS showed good reliability and consistency using data collected from a sample of caregivers of autistic children. The measure demonstrated relatively moderate accuracy for detecting clinical levels of depression, anxiety, and distress in caregivers; suggesting its potential effectiveness as a screening measure for autistic caregivers in crisis due to pandemic stressors.

**423.197 (Poster) Shareholder Suggestions: Implications for Policy Changes to Improve Publicly Funded Early Intervention for Autistic Children**

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**Background:** Intensive early intervention (EI) can be critical for autistic children and their families, but accessing these services can be difficult. Even among families who access the EI system, canceled and missed appointments are high, and families vary in their reports of satisfaction with EI (Bradhaw, Steiner, Gengoux, & Koegel, 2015). Clinicians and system administrators also report challenges delivering effective EI. Yet, policy decisions affecting early intervention are often made using a top-down approach, where system officials establish and implement policies with little or no community input. Shareholder input is needed to address the issues families, providers, and leaders find most important to inform policy changes aimed at improving publicly funded EI for young autistic children.

**Objectives:** This study aimed to learn about community providers’, leaders’, and families’ experiences with the publicly funded EI system. Specifically, we used a qualitative approach to solicit shareholder input on strategies that could improve the EI system.

**Methods:** Semi-structured interviews were conducted with 38 early intervention providers, 6 agency leaders, and 20 families receiving publicly funded EI in two distinct geographic regions serving highly under-resourced populations within the United States. Clinician and leader interview questions probed for barriers and facilitators to supporting families who receive publicly funded EI and suggestions for improving service delivery and the service system broadly. Families were queried about their attitudes towards EI and suggestions for improving EI for families of young autistic children based on their personal experiences with the system. Transcripts were analyzed iteratively based upon an integrated approach incorporating both inductive and deductive features.

**Results:** Shareholders described three important areas that have direct implications for policy reform in the provision of publicly funded EI services: the billing/funding structure of EI, adapting the content and scope of services, and where and when EI is delivered. Providers described challenges with the billing structure and the fee for service model often used in EI. Agency leaders mentioned difficulties with delivering services to families who have experienced poverty and trauma; they suggested adopting a trauma-informed approach and providing additional funding to support struggling families. Families suggested greater flexibility in scheduling (e.g., weekend sessions) and in mode of delivery (e.g., telehealth vs. in-person), as well as session flexibility to improve access to services for working families.

**Conclusions:** Community shareholders have valuable insight about how to improve publicly funded early intervention. When provided the opportunity, caregivers, clinicians, and agency leaders offered actionable steps, such as allowing clinicians to bill for time spent teaching strategies to caregivers, to improve publicly funded EI for young autistic children. Policy should be informed by shareholder input and include their feedback in every step of the policymaking process.

**423.198 (Poster) Single Mother Parenting of Children with ASD**

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**Background:**

A child with special needs presents parents with a significant challenge on a personal and a family level. Having a child with special needs is often experienced as a crisis, after which life will no longer be as it was until that point. Parenting a child with a disability affects the parents’ feelings, leading to higher stress and lower well-being, and even more–so when parenting children with ASD due to the children's core characteristics. In recent decades, there has been a change in the traditional family model, allowing different models, including single-parent models. Research has demonstrated that in general, single mothers are more likely to exhibit parenting stress. There is a paucity of research on single mothers of children with ASD. The few studies that have been published show that their challenges are unique, stemming from their dual challenge in comparison to two-parent families of children with ASD.

**Objectives:**
The purpose of this study was to extend the small body of research on this topic and better understand the mothers' experiences via a qualitative, non-judgmental research design. The research question posed was “What is the experience of single mothers parenting children with autism?”

Methods:

The study was a qualitative photo-narrative study in which life stories are told. It included seven single mothers parenting at least one child diagnosed with ASD who told their life stories and took photographs depicting their motherhood experience. Three assessment measures were used – an open in-depth interview, photographs that the participants took, and a reflective researcher's diary written during and after the interviews. The data analysis was carried out in two stages. In the first stage, a holistic analysis was conducted for each participant separately and in the second stage, a thematic content analysis was carried out regarding the interviews and the stories about the photographs that the participants took.

Results:

The content analysis yielded five major themes and five subthemes related to the mother's life experience of parenting children with ASD. The first theme was the shattering of the dream; the second was the mothers and the educational setting and included two subthemes - the kindergarten and the transition from kindergarten to school; the third was the present in the shadow of the future and included three subthemes - daily challenges, the shadow of the future, and different parenting; the fourth was resilience; and the fifth finding meaning.

Conclusions:

This study expands and enriches knowledge concerning the mothers' experience as single mothers parenting a child with ASD. The findings show that there is a dire need to assist the mothers throughout their life, whether at the first stage, before and during the diagnosis, during the educational transition periods, and with much-needed continuing support systems. Notwithstanding, the data indicate that although the mother's daily life is challenging, they develop and draw strength from their love for their child and their surrounding support systems.

423.199 (Poster) Sleep Quality and the Broad Autism Phenotype in Mothers of Autistic Children

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Background:

It is well-documented that sleep quality is poorer among autistic adolescents and adults relative to their nonautistic peers (Morgan et al., 2020), and autism symptoms are related with sleep quality (Holloway et al., 2013; Schreck et al., 2004). Issues with sleep have also been reported in mothers of autistic children relative to mothers of nonautistic children (Hodge et al., 2013; Lopez-Wagner et al., 2008). While environmental factors, such as child awakenings, can impact maternal sleep quality, there is also growing recognition that genetic factors play a major role in sleep-related phenotypes (Madrid-Valero et al., 2020), and that shared genetic mechanisms may underlie autistic traits and sleep difficulties (e.g., Taylor et al., 2022). In this study we examined the interface between sleep disturbances in mothers of autistic children and the expression of the broad autism phenotype (BAP; i.e., subclinical markers associated with autism that are thought to reflect genetic liability for autism). Documenting associations between sleep disturbance in mothers of autistic children and BAP markers of genetic liability can inform potential shared mechanisms that may lead to the co-occurrence of sleep disturbance and autism.

Objectives:

- Compare sleep quality between mothers of autistic children and control mothers.
- Examine associations between the BAP and sleep quality within mothers of autistic children.

Methods:

Participants included 69 mothers of autistic children and 105 control mothers who had children without any history of developmental disorders. Mothers were 32–62 years old. Participants completed the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989), which is a well-validated 19-item questionnaire that yields total and subscale scores marking difficulties in various aspects of sleep (e.g., quality, latency). Mothers also filled out the Broad Autism Phenotype Questionnaire (Hurley et al., 2007), which contains 36 items related to BAP features. Groups were divided into BAP+ and BAP- groups for the total score and each subscale based on cut-offs outlined in Sasson et al. (2013).

Results:
Mothers of autistic children had higher total sleep scores and had higher scores in the domains of sleep latency, disturbance, medication, and daytime dysfunction (Table 1). Among mothers of autistic children, those who were BAP+ for the rigidity subscale had poorer overall sleep scores relative to those who were BAP- for this subscale (p=.043, partial-eta squared=.07). There were no other sleep differences between groups from the other BAP subscales or overall score (ps>.218).

Conclusions:

Our findings build on a body of research documenting sleep issues among mothers of autistic children relative to control mothers. Additionally, mothers of autistic children who showed more rigid BAP traits had poorer sleep quality. Prior findings suggest that poor sleep is associated with worse cognitive flexibility (Honn et al., 2019), which may be reflected in our findings, such that poorer sleep quality leads to increased rigidity (i.e., less flexibility). Alternatively, those with more rigid personality traits may have more issues with falling and staying asleep. This association between the BAP and sleep quality support further study into potential shared mechanisms underlying the co-occurrence of sleep disturbance and autism.

423.200 (Poster) Stakeholder Consultations Towards the Development of Local Models of Care for Children with Developmental Disabilities in Low Resourced Settings in Kenya

Background: Nearly one million people live with disabilities in Kenya, though data disaggregated by disability is scarce (KNBS 2019). A nationwide survey of 7609 children found that 11.4% had a disability and 2.5% were identified with an intellectual disability (KISE 2018). Children with developmental disabilities (DD) including autism and intellectual disabilities remain undiagnosed, many are identified at a later age when they are likely to present with severe disabilities and comorbidities. Families of children with DDs experience multiple challenges, including stigma and discrimination, care burden, social isolation, and limited access to formal care and essential services. SPARK (SuPPorting AfriCAN communities to increase the Resilience and mental health of KiDS with developmental disorders and their caregivers) is a multi-site study in Kenya and Ethiopia. This paper examines a sub-set of findings from consultative workshops with Kenyan stakeholders conducted between March and July 2022.

Objectives: 1) to identify and map out available services and support systems for caregivers and children with DDs in rural and urban informal settings; 2) to explore and understand local resources and approaches used in identifying children with DDs, to enrich the content development of SPARK’s sensitization training package and a novel case detection tool for use by lay community resource persons.

Methods: SPARK Kenya is implemented in the rural coastal town of Kilifi and Nairobi’s informal settlements. Community representatives and professionals participated in consultative workshops that were organised separately (n=8, one of each group per site in two workshops). Fifty-two participants were purposively selected to represent carers of children with DDs or persons with lived experiences; professionals from health, education, and social service sectors; and community leaders/representatives such as religious leaders, community health volunteers, and community-based organisations. Workshop findings were later presented in three meetings with SPARK’s community advisory boards (Kilifi and Nairobi), and SPARK’s national advisory board for validation. Presentations were structured with guided topics, and data were captured through detailed notes, and audio recordings transcribed verbatim. Workshop summaries were developed capturing emerging themes and future systematic analysis will be performed using a thematic approach.

Results: Stakeholders mapped out service points that met different needs of families of children with DDs within these settings (Table 1). However, workshop discussants and advisory board members raised concerns that many caregivers lack awareness of location and access to these services. A by-product of these consultations led to the development of preliminary resource-guides tailored for each of these contexts. These consultations also generated a wealth of local resources including: training manuals; assessment forms used by health professionals for diagnosis and education professionals for school placement for learners with various DDs; educational resources with information on disability awareness, and advocacy for the rights of persons with disabilities.

Conclusions: Stakeholders identified the need to proactively promote linkages and support for families of children with DDs and their families. Upon verification and refinement of these resource guides, they will be used by trained community resource persons tasked with identification of children with DDs, to promote and increase referral uptake of locally-available services.
Background: The transition to adulthood can be a particularly vulnerable period for autistic individuals. Research efforts are needed to identify accessible supports for this population, often neglected in intervention research. Existing programs for autistic adults have limitations which include minimal representation in program creation, implementation, and evaluation of program outcomes (Monahan et al., 2021). Programs are needed to build upon the self-reported priorities of autistic people and minimize the pressure to camouflage their true selves. To address these limitations, this study utilizes a community based participatory research (CBPR) approach. Autistic young adults and their allies were involved as both research participants and partners to explore the benefits of Toastmasters for autistic young adults as a program to promote social communication skills and self-efficacy in a “no-pressure, supportive” environment (Uttal, 2013).

Objectives: Utilizing an inclusive model to yield important practice-based findings, the present study aimed to provide a comprehensive understanding of whether, for whom, and under what circumstances Toastmasters is a meaningful community-based program for autistic participants. To address this aim, we conducted qualitative interviews to understand first-hand experiences of autistic Toastmasters participants and their caregivers/mentors.

Methods: Participants included 20 autistic adults (ages 18-54, 60% White, 65% male) who were (former or current) Toastmasters and 10 caregivers/mentors who served in support roles. Each participant was individually interviewed for 45-60 minutes. The interview protocol, developed in collaboration with our community partners, involved open-ended questions, including probes for information on previous involvement in interventions, as well as specific information about their participation in Toastmasters (e.g., What motivated you to participate in Toastmasters? Did the program meet this need and/or your expectations? Why or why not? What benefits have you received from participation in Toastmasters?). Interviews were audio-recorded and transcribed verbatim. Inductive qualitative coding (Braun & Clarke, 2006; Thomas, 2006) is currently being utilized to assess data and explore relevant themes and recommendations. A preliminary codebook and protocol have been developed and interrater reliability (pooled Kappa of 80%+) will be established between four doctoral level coders trained in this method.

Results: Data analysis is ongoing. Preliminary analysis of the interviews revealed themes related to developing friendships and social connections, comfort with speaking and communicating, and benefits and barriers related to participation in Toastmasters. We anticipate additional themes related to specific interview questions (e.g., format of Toastmasters meetings, reasons for joining, perceptions of others, and time commitment) will emerge.

Conclusions: Autistic perspectives are an essential component to the implementation of community-based services and research design. Through this CBPR study, we hope to amplify autistic voices and experiences. Data from this study will inform the implementation of a pilot study of a Toastmasters for autistic participants who are first time participants. With the inclusion of autistic perspectives to guide our work, we hope the experiences of these individuals will improve, specifically those related to communication, leadership skills, self-confidence, and social participation.


Background:
Parents of children with ASD report considerable higher levels of stress compared to parents of neurotypical children and parents with other neurodevelopmental conditions (Davis & Carter, 2008; Hayes & Watson, 2013). Although their mental health is extensively investigated, studies regarding their eating behavior and physical health, and specifically stress-related health factors, are scarce, and have only been performed in mothers, not in fathers. In addition, most studies focused on parents of children with ASD in a broad age-range, while the early childhood may be particularly important period to study as early processes may lay foundation for the health of parents later in life.

Objectives:
We investigated whether (1) there are differences between mothers and fathers of a child with ASD in early childhood and males and females from the general population regarding stress, eating behavior and adverse health, (2) stress is related to eating behavior and adverse health in mothers and fathers of a child with ASD in early childhood.

Methods:
In total, 91 parents (48 mothers and 43 fathers) of 49 young children with ASD (3-7 years) participated in the study. Parents filled in self-report questionnaires, including the Parenting Stress Questionnaire (OBVL) and the Dutch Eating Behavior Questionnaire (DEBQ). Adverse health was measured using physical measurements of Body Mass Index (BMI), waist circumference, blood pressure, cholesterol,
triglycerides, glucose. The percentage of parents scoring above a certain cut-off was compared to the percentages of same-aged individuals from the norm-population (OBVL and DEBQ) or the Lifelines Cohort Study (Slagter et al., 2017).

**Results:**
More than half of the mothers and one third of the fathers of children with ASD experienced a clinical level of parenting stress, which is more often than parents of neurotypical children (10%). Mother’s prevalence rates of obesity (39%), abdominal obesity (60%) and metabolic syndrome (22%) were respectively 2.7, 1.6, and 2.6 times higher than in females from the general population. There were no differences between fathers of ASD children and the general population regarding adverse health. Parenting stress was significantly related to emotional (r = .53) and external eating (r = .47) in mothers, but not in fathers. There were no correlations between parenting stress and adverse health in mothers or fathers of a child with ASD.

**Conclusions:**
Stress impacts quality of life and could cause health-risks later in life. It is therefore crucial to diagnose and treat stress symptoms in mothers and fathers of a child with ASD, to enhance QoL and to prevent health problems later in life.

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**423.203 (Poster) Supporting Diversity, Equity & Inclusion (DEI) Recruitment with SPARK Research Match**

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Background: SPARK (Simons Foundation Powering Autism Research) is an online, longitudinal research study with the largest autism spectrum disorder (ASD) cohort. To date, there are over 296,000 participants enrolled, including over 117,000 individuals with ASD and their families. All participants who sign the SPARK consent agree to be contacted for future studies related to autism research. Research Match (RM) is a core program of SPARK, through which researchers can recruit participants into new research studies. Aiming to address historic disparities in research participation by Black or African American individuals, the SPARK RM diversity equity and inclusivity (DEI) initiative requested and supported applications that recruited Black/African American participants.

**Objectives:**
- Report recruitment metrics for DEI projects using SPARK Research Match
- Assess the likelihood of Black/African American participants to respond to DEI studies compared to studies that did not specifically focus on DEI (non-DEI studies)

**Methods:** The SPARK Research Match DEI initiative provided researchers with up to $20,000 in incentive funding. Applicants were required to have completed previous work in the area of diversity/inclusion and special consideration was given to projects that addressed topics of high impact and/or addressed a specific need for Black communities. Investigators, upon approval, recruited from SPARK. Applications were reviewed by the SPARK participant access committee, including researchers and community representatives. RM studies were approved to recruit for one year with the possibility of renewal and were categorized as either in-clinic studies or online survey studies with additional support to build the survey workflows. Eligible participants were identified based on study inclusion/exclusion criteria and were invited via email. Participants indicated if they were interested and provided authorization for SPARK to share contact information with the study team.

**Results:** As of October 2022, SPARK approved 7 applications for Research Match projects providing support for DEI studies. For 4 completed DEI studies consisting of online surveys, the number of eligible SPARK participants ranged from 1,630 to 25,553. Of the participants invited, on average 22.3% of participants expressed interest in participating in the DEI studies. Participants received a range of $10-$75 per person. All 4 projects met their recruitment targets. In comparison, among 43 non-DEI studies, 31 (72.1%) projects met their recruitment targets. Of the participants eligible to participate in the DEI studies, on average 23.0% expressed interest in participating in DEI studies and 40.8% expressed interest in participating in non-DEI studies. This poster will assess other factors related to study participation, such as study burden to the participants and a comparison of interest in participation across racial/ethnic groups.

**Conclusions:** SPARK Research Match is an effective program for supporting recruitment of Black/African American participants in DEI and non-DEI studies.

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**423.204 (Poster) Supporting School Participation for Autistic Children: Caregiver Perspectives of School Transport**

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Background:
The right to access education is enshrined in the Declaration of the Rights of the Child. Despite having the same rights, autistic children can face more challenges accessing education than other children. Getting to and from school is essential to supporting school participation for autistic children, yet there has been limited research on experiences related to school transport and the barriers and enablers to getting to school. Given that caregivers are often the primary decision-maker regarding transport for their child, understanding their experiences of transporting their child to school is essential to supporting the engagement and participation of autistic children in school.

Objectives:
This study explores the experiences of caregivers on transporting their autistic children to school, with the aim of providing insight into transport related challenges and enablers.

Methods:
This study utilised a qualitative approach guided by interpretive phenomenology to explore the lived experiences of caregivers. Semi-structured interviews were conducted with nine caregivers of autistic children aged between 8 to 16 years of age. Interviews were focused on examining a typical trip to and from school, caregiver experience, challenges and enablers. Interviews were transcribed and analysed using Colaizzi’s qualitative data analysis framework.

Results:
There were three distinct phases describing the transport experiences of caregivers: the morning routine, the journey, and the destination. The morning routine was stated by caregivers to be essential in preparing their child to transport to school. Caregivers reported carefully tailoring their morning routine to facilitate a smooth start to the day for their child. Deviations to routine could result in challenges on the way to school that consequentially negatively impacted their child’s performance and engagement in the classroom and during peer interactions. Caregivers who used bus services specific for children with disabilities reported a “negative”, “disappointing” or “sad” experience for their child, reporting that bus services were often understaffed, undereducated, and ill-equipped to transport autistic children. When driving their child to school, caregivers reported high levels of stress and challenges including behaviours such as removing seatbelts, self-injury or physical aggression to the driver and/or passengers. Parent described these behaviours occurring as a result of sensory overstimulation or a disruption to the morning routine. Once arriving at school, caregivers reported challenges associated with poor communication with bus drivers and school staff. This was believed to impact the safety of their child and could often result in their child becoming more distressed if they were not adequately supported once arriving at school.

Conclusions:
Challenges getting to and from school have the capacity to negatively impact the ability of autistic children to gain an education. Caregivers require additional support to ensure their child gets to school safely. We make recommendations for funding distribution, resources and education that may be beneficial in supporting autistic children in fulfilling their right to access to education.

423.205 (Poster) Supporting the Educational Experiences of Autistic Children during COVID-19: A Focus on Motivating and Encouraging Takeaways from Parents
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Background: COVID-19 disrupted the educational and health services provided to autistic children. Parents played an important role in supporting their child’s development and access to services during COVID-19, which included frequent changes to modalities across the pandemic and ways to access everyday services. Given the challenging context, it is critical to understand the experiences families faced, especially regarding what aspects families found potentially motivating and encouraging.

Objectives: This study sought to learn more about how parents supported their autistic children during COVID-19 with a focus on what kept families motivated and encouraged in supporting their child’s academic learning and engagement. This study used qualitative methods to identify and understand the various themes highlighted by parents reflecting on how they supported their child’s educational journey during COVID-19.

Methods: Data come from an online survey project focused on literacy and educational support during COVID-19. Participants (n = 402) were enrolled in the Simons Powering Autism Research for Knowledge, a national database of families with a child with a verified autism diagnosis. All families completed the survey about a child (80% male) who was in the K-6th grades during the 2019-2020 and 2020-2021 school years. We used qualitative approaches to analyze an open-ended question that asked parents to reflect about motivating and encouraging aspects in supporting their child’s access to educational resources during COVID-19. Thematic coding was completed by two
Results: Seventeen broad themes emerged. The most prevalent theme was Areas of Positive Support (47%), with parents frequently acknowledging the support given by their child’s teachers, service providers, and school systems. Other common themes included Learning Spaces (28%, including homeschool and online learning spaces), Services (25%, often praising service providers for ease of access/commitment to supporting their child), Child’s Positive Progress (20%, highlighted child growth in academic learning), and Parent Role (16%, often focused on the parent commenting positively on educating their child). Less prevalent themes included Communication/Relationship (11%, focused on maintaining conversations with teachers and families), Parent Understanding (11%, often through watching their child engage in online learning), Establishing Routines/Schedules (11%, focused on creating structure for their child’s learning), Technology (7%, focused on using online software programs for learning and communication), Child Attributes (7%), Pre-COVID-19 Comparisons (4%), Non-School Activities (3%), and Assessment/Evaluation (2%). Approximately 11% of responses were Nothing (i.e., explicitly wrote that nothing was motivating). Twenty-five families left the question blank.

Conclusions: While we continue to understand the effects of COVID-19 on the educational achievement of students across the world, our findings highlight that parents and caregivers identified a number of encouraging and motivating aspects of the experience. Findings highlight the important role that schools, teachers, and service professionals played in supporting autistic children during COVID-19 and the ways that parents were able to learn more about how to support their child’s learning due to the remote learning context.
Conclusions: Our findings indicate that the association between having ASD and poorer social competence is moderated when parents have good PRF, emphasizing its essential role when parenting children with ASD. These findings highlight PRF as a potential target for intervention among parents of children with ASD.

423.207 (Poster) Teachers’ Affect within Interactions with Their Autistic Students during Preschool through 3rd Grade Literacy Activities

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Background: Teacher affect is an important, yet understudied, feature that impacts students’ instructional experiences (e.g., McLean & Connor, 2018). Studies centering on neurotypical children have found that teachers’ positive affect or emotional expressions have led to positive student outcomes (e.g., Buric, 2019; McLean & Connor, 2017). Few studies have examined teacher affect with autistic students and whether or how affect impacts academic outcomes.

Objectives: This study expands on McLean and Connor’s (2017) measure, the Teacher Feedback Coding System—Academic (TFCS-A), by adapting and creating new teacher affect types based on autistic students’ experience inside the classroom. We examined teachers’ responses and affect types following students’ communication initiations, as well as the relations between teachers’ affect and student characteristics (autism features, cognitive functioning, and teacher-perceived behaviors).

Methods: Our study included a subset of teachers and students who were recruited for a larger study that evaluated the efficacy of a classroom-based intervention (R324A140005). The sample included 34 teachers and their 43 preschool–3rd grade autistic students ($M_{age} = 7.68; SD = 2.14$). Using archival video observations and Noldus Observer® Video-Pro Software (XT 14; 2017), we examined teachers’ affect across two dimensions: Response Type (contingent, not contingent, responds to attention) and Affect Type (positive, negative, negative/neutral). Interrater reliability was high (≥80%). We used the DAS-II (Elliot, 2007) and MSEL (Mullen, 1995) to assess students’ cognitive functioning, the ADOS-2 (Lord et al., 2012) to understand autism symptomology, and the Teacher PDD Behavior Inventory (Cohen & Sudhalter, 1999) to assess student behavior.

Results: Thirty-six students received at least one positive, contingent response ($M = 3.56; SD = 3.25$), and 33 students received at least one response that was neutral/negative and non-contingent ($M = 1.98; SD = 2.53$). Twenty-nine students received at least one positive, non-contingent response from their teacher ($M = 1.30; SD = 1.46$). We found strong negative relations between students’ cognitive functioning and teachers’ negative affect ($r = - .50, p < .001$), and moderate negative relations between autism features and positive affect ($r = - .38, p < .05$). We also found moderate negative relations between teacher-perceived problem behaviors, neutral affect ($r = -.34, p < .05$), and contingent responding ($r = - .42, p < .05$).

Conclusions: We found that the majority of students received at least one positive, contingent response, and one neutral/negative, non-contingent response from their teachers. Furthermore, we documented links among negative affect with more autism features, perceived problem behaviors, and less developed cognitive functioning. These student characteristics were also related to fewer neutral and contingent responses from teachers. These findings raise some concern regarding the quality of interactions between students with autism and their classroom teachers, which in part, is associated with individual student characteristics.

423.208 (Poster) The Convergent Validity of the Family Outcome Questionnaire (FOQ) for Measuring the Effectiveness of Early Intervention Services in Taiwan

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Background:

The importance of measuring family outcomes in evaluating the effectiveness of early intervention (EI) programs has been emphasized during the past decades as more research shows that the participation of families plays a vital role in enhancing the development of children with special needs. On the other hand, the content of the family outcome measure should reflect the status and cultural values of the community to meet the needs of the families receiving EI. In Taiwan, comprehensive and culturally sensitive family outcome measures for EI service are scarce. The Family Outcome Questionnaire (FOQ) is developed with the cultural adaptation of tools from western countries to assess the outcomes of families receiving EI in Taiwan. In this study, we examined the psychometric properties of FOQ by investigating its convergent validity.

Objectives:
The purpose of this study was to investigate the convergent validity of the FOQ when used to measure family outcomes in EI service delivery.

Methods:

A total of 52 primary caregivers whose children received EI services in a city hospital participated in the study. They completed the FOQ, the Family Outcomes Survey Revised (FOS-R), and the Parenting Stress Index-Fourth Edition (PSI-4). The FOQ was modified from the FOS-R and aims to measure eight aspects of family outcomes of EI services in Taiwan. The FOS-R has been mainly used to measure the family outcomes and the helpfulness of early intervention in the USA. The PSI-4 assesses three domains of parental stress: child characteristics, parent characteristics, and situational/demographic life stress. To verify the convergent validity, we conducted Pearson's product-moment correlation to examine the correlation between the total score of the FOQ, the two parts of the FOS-R, and the three domain scores of the PSI-4. The FOS was expected to be positively correlated with the two parts of the FOS-R and negatively correlated with the child domain, parent domain, and life stress domain scores of the PSI-4.

Results:

The mean age of 52 primary caregivers receiving EI services was 39.37 (SD=4.89), 84.6% of the participants were mothers, and the diagnoses of their children were autism spectrum disorders (30.8%), developmental disorders (25%), and attention-deficit/hyperactivity disorder (23.1%) and others. The total score of the FOQ positively correlated with the family outcomes part of the FOS-R ($r=0.74, p<0.01$) and the helpfulness of the early intervention part ($r=0.58, p<0.01$). In addition, the total score of FOQ significantly negatively correlated with the child domain, parent domain, and life stress domain scores of the PSI-4 ($r=-0.42, p<0.01; r=-0.43, p<0.01; r=0.47, p<0.01$).

Conclusions:

The FOQ has a moderate to good convergent validity with the FOS-R and PSI-4, providing preliminary evidence of adequate validity in measuring family outcomes in EI services. To construct more solid psychometric evidence and investigate the suitability of usage of FOQ across families with different needs of EI, we expect to examine discriminative validity and include more children with diverse diagnosis in the future. Clinicians can use the FOQ with families who receive EI to understand the different factors of family outcomes comprehensively.

423.209 (Poster) The Development and the Reliability of a Family Outcome Questionnaire (FOQ) for Measuring Effectiveness of Early Intervention Services in Taiwan

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Background: When evaluating the effectiveness of early intervention (EI) programs, we should focus on measuring family as well as child outcomes. The core concept of family-centered in EI services has prompted services providers to value input from families and plan services accordingly. Therefore, in the past two decades, measurement tools focusing on family outcomes have been developed in western societies. However, as the main concerns of families and the service delivery models may vary across cultures and societies, a family outcomes measure that could reflect the needs and reality of the society should be developed when evaluating the effectiveness of EI services. A culturally sensitive family outcomes measure with adequate psychometric properties can serve as a useful reference and guidance for service providers in improving service quality. In Taiwan, with the increasingly accessibility and involvement of families in EI programs, there is an urgent need of developing appropriate family outcomes measure to appraise service quality and guide the service planning.

Objectives: This study aimed to develop a Family Outcome Questionnaire (FOQ) that is applicable to the evaluation of effectiveness of the current EI services at the medical facilities of Taiwan, and investigate the reliability of the FOQ.

Methods: The FOQ was developed in two stages: item construction and item revision. The initial items of FOQ were constructed based on current family outcome measures and focus group interviews with 10 EI professionals working in medical facilities. We then revised the items based on eight experts consultations about the measurement structure, item format, and appropriateness for caregivers. Next, we interviewed ten main caregivers receiving at least six months of services to comment on the ease of understanding and sentence fluency of the items. Finally, we revised the items according to their comments, then obtained the first edition of the FOQ. A total of 30 caregivers receiving EI services were recruited for reliability examination and assessed with FOQ for family outcomes. We calculated Cronbach's alpha coefficient to show the internal consistency of the FOQ.

Results: The FOQ was composed of 49 items using a 5-point Likert scale, producing Total Scale Scores and 8 Subscale Scores. A total of 30 caregivers receiving EI services, whose children mostly were autism spectrum disorders, developmental disorders, and attention-
Methods: A survey of parents of ASD children was conducted in June 2022. There were 679 participants enrolled, among whom 605 were mothers of children with ASD and 74 were fathers. The measures were Parental Discrimination Perception Scale, Social Anxiety Scale, Mindfulness Scale and Flourishing Scale. The descriptive statistics, including mean, standard deviation, minimum, and maximum values, were calculated for each scale. The differences between groups were analyzed using independent samples t-tests. The mediations were tested using the PROCESS Macro for SPSS (Model 4; Hayes, 2017). The significance level was set at 0.05.

Results: The results show that: (1) The perceived discrimination of parents of children with ASD was positively correlated with their social anxiety and negatively correlated with mindfulness and psychological well-being ($\beta = -0.51$, $P < 0.001$). Social anxiety was negatively correlated with mindfulness ($\beta = -0.43$, $P < 0.001$) and positively correlated with ASD severity ($\beta = 0.19$, $P < 0.001$). The mediation analyses revealed that social anxiety fully mediated the relationship between parental discrimination perception and psychological well-being, while mindfulness partially mediated the relationship. The results also indicated that the interaction between child age and ASD severity was significant, with older children with more severe ASD having lower psychological well-being.

Conclusions: The results suggest that parental discrimination perception and social anxiety have significant impacts on the psychological well-being of parents of children with ASD. Mindfulness plays a role in mediating these effects. The interaction between child age and ASD severity should be considered in future studies.
correlated with mindfulness and psychological well-being, while mindfulness was positively correlated with mental health \( (P < 0.001) \). (2) The perceived discrimination of parents of children with ASD can not only directly predict psychological well-being, but also indirectly predict psychological well-being through the mediating effect of social anxiety \( (P < 0.001) \). (3) The first half of the mediating effect of social anxiety is regulated by mindfulness \( (P < 0.001) \).

Conclusions: In summary, the psychological well-being of parents of children with ASD can be effectively improved by the reduction of their discrimination perception, social anxiety and the increase of their mindfulness level. Social anxiety has a mediating effect and mindfulness has a regulating effect.

423.212 (Poster) The Experiences of Autistic and Non-Autistic Youth and Their Caregivers Completing an Autism-Tailored Measure of Stress and Trauma: A Qualitative Study

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Background: Adverse childhood experiences (ACEs) are more common among autistic people compared to the general population. Quantitative and qualitative findings also suggest that many autistic individuals experience chronic stressors (e.g., social adversity, discrimination, sensory distress) that can detrimentally affect well-being, but which are not systematically assessed by ACEs measures.

From this evidence base, the Childhood Adversity and Social Stress (CASS) Questionnaire was developed to assess both traditional (e.g., physical and sexual violence) and autism-related adversities and traumatic reactions.

Objectives: We gathered qualitative feedback from autistic and non-autistic youth and their caregivers who completed the CASS to examine common themes and differences in their experience (e.g., useability, acceptability) of this novel tool.

Methods: Thirty youth (age 14-22; autistic n=16, non-autistic n=14) and their caregivers participated in a think-aloud cognitive interview while completing the CASS. Two autistic youth and one caregiver of a non-autistic youth were excluded due to language difficulties. The CASS contains two sections: Symptoms (symptoms of traumatic stress in the past month) and Adversities (lifetime history of adversities).

At the end of the cognitive interview, participants were asked for their general impressions of the CASS (Feedback). Thematic analysis was conducted to develop and apply a coding scheme to these three interview sections. Coding was completed by MH and CS along with a team of 4 undergraduate research assistants (>80% inter-rater reliability) with supervision from CK. To mitigate potential bias, this team represented varying sociodemographic characteristics and training/expertise. Autism diagnoses were confirmed using the ADOS Module 4 in 11/14 autistic youth with valid interview data.

Results: Common themes included strengths of the CASS (endorsed by >75%), but also comments about question and response option wording, the operationalization of trauma, and reporting challenges faced by caregivers. CASS strengths included question clarity, helpfulness of visual cues, and inclusion of stressors that captured participant experiences. Most (>50%) autistic and non-autistic youth and caregivers suggested additional adversities to include (e.g., moving, parents separating, interpersonal conflict) and expressed difficulties remembering details of past adversities and determining whether they were “severe enough” to report. In terms of differences, more caregivers of autistic youth expressed difficulty reporting on their child’s ACEs and symptoms due to lack of knowledge/insight into their child’s experiences and differences in their vs. their child’s perception of the event. More autistic than non-autistic youth expressed difficulty providing details about adversities, in part due to autistic youth experiencing more chronic and/or repeated adversities. For the full coding scheme and code frequencies, see Tables 1 and 2.

Conclusions: Findings support and extend prior work by illustrating that adversities may not only be more prevalent and more complex in autistic youth but also that, as a result, autistic youth and their caregivers may experience more difficulty and confusion when reporting on trauma. Multi-informant approaches, clear examples and overall specificity in language may help autistic youth and their caregivers provide the most accurate, complete picture of their experiences of stress and trauma as possible.

423.213 (Poster) The Family Experience of Early Supports When Attitudes Are Changing, Funding Is Available and Families Have Choice and Control

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Background:

Attitudes towards autistic people and supports have changed considerably since the emergence of developmental and behavioural interventions. While these approaches have demonstrated positive child outcomes, less is known about other effects including those relevant to the family unit, or indeed which outcomes families see as priorities. Family wellbeing is known to play a critical role in child development.
In Australia, the National Disability Insurance Scheme (NDIS) provides individualised funding for supports to enable people with disabilities to exercise “choice and control” over their supports. Families can theoretically choose their supports based on individual need. This Australian context provides an important opportunity to understand the family experience of service choice for autistic children.

Objectives:

We collected information about 1) supports families access for their autistic preschoolers, 2) potential outcomes they value most, and 3) caregivers’ wellbeing and family experience of autism.

Methods:

This mixed methods study comprised a survey (target n=100) followed by semi-structured interviews (target n=20), both conducted online. The study targeted families in Australia with at least one autistic child who had not yet started school, with study promotion via advocacy groups and social media. Survey participants completed the EuroQol-5D-5L, a generic measure of their health-related quality-of-life, and the Autism Family Experience Questionnaire (AFEQ). Interview participants provided more detailed information about their supports, factors influencing their choices, and potential outcomes they considered most valuable.

Results:

Preliminary survey results to date are from 72 respondents from varied socioeconomic and family backgrounds, reflecting children ranging from 25 to 71 months of age, most (94.4%) accessing the NDIS.

Caregivers’ self-reported global health (EuroQol-5D-5L visual analogue scale where 100=best imaginable health) averages 56.59 (95%CI 51.33, 61.86), much lower than previously published general population means in Australia and other developed countries (e.g., 78.55; (McCaffrey et al., 2016)). The mean total AFEQ score is 144.43 (95%CI 138.84, 150.03), broadly in line with previously published results (e.g., 141.0; (Leadbitter et al., 2018)).

Preliminary analysis of fifteen interviews completed to date reveals emerging themes of caregivers’ evolving competence in parenting and advocating for an autistic pre-schooler, and difficulty navigating an unfamiliar and under-resourced system. Therapists who offer flexibility and neurodiversity-affirming practices are clearly preferred by some caregivers. Participants have often been unaware of specific techniques implemented, but seek a flexible approach to their changing needs. Prior knowledge of autism and/or the support system appear to improve access to services and clarity about desired outcomes.

Possible association between the family experience and caregivers’ HRQOL will be explored via regression analysis. Thematic analysis will be completed to explore the diverse views and values of participants.

Conclusions:

Australian families access supports—predominantly speech pathology, occupational therapy and psychology services—using public funding available through the NDIS. While financial burden may be reduced and/or the level of support increased, likely inequities persist, reflected here in the heavy reliance on prior knowledge of autism and caregiver time to attend appointments and implement strategies at home. Many are actively seeking neurodiversity-affirming practices.

423.214 (Poster) The Impact of Disclosing an Autism Diagnosis in an Online Dating Context.
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Background:

Previous cross-sectional research has highlighted that an explicit autism label in an autistic male’s online dating profile has a differential impact, depending upon the potential partners’ level of stigmatisation towards autism. Females with higher stigmatisation towards autism rate dating profiles with an explicit disclosure of autism more negatively in terms of ‘desire to date’. However, females with lower stigmatisation towards autism rate the same profile more positively in terms of ‘desire to date’. This is consistent with other research identifying negative first impressions of autistic people. What is unknown is how first impressions may change after a diagnosis of autism is revealed.

Objectives:

To identify the impact of females’ stigmatisation towards autism upon changes in their perceived ‘desire-to-date’ an autistic male.
Methods:

Participants were 204 females aged 18-25, residing in the UK, who would date a male. All participants indicated they were aware of having had contact with an autistic person.

Participants read an online dating profile of a male that included a number of autistic-like traits but did not explicitly mention autism (from previous research). Participants were then asked to rate their desire-to-date the person in the profile. Participants were then told the person in the profile is autistic with an explanation of autism, and were asked if they had realised the person in the profile was autistic. 168 said no and were included in the analysis. Participants then completed a questionnaire assessing their experience of and stigmatisation towards autism. Finally, participants rated again their desire-to-date the same profile that they had rated previously, except with the addition of the sentence ‘I am autistic’.

Results:

For those who had not previously considered the profile might be an autistic male, there was a significant decrease in the desire-to-date the person in the dating profile after a diagnosis of autism had been stated (t=2.34, df=167, p=.02). Increased stigmatisation towards autism correlated with a larger decrease in the change in desire-to-date ratings (before and after autism was stated, r=-.33, df=168, p<.001). The stigmatisation item relating to dating specifically was analysed separately. Those who would be definitively unwilling or somewhat unwilling to date an autistic person, had a significant decrease in their desire-to-date ratings. Those who would be somewhat willing to date an autistic person did not change their desire-to-date ratings. Those who would be definitely willing to date an autistic person saw a significant increase in their desire-to-date ratings (F(3,167)=2.50, p<.001). (Note: none of these findings were significant for the 36 participants who said that they had initially thought the person in the profile might be autistic).

Conclusions:

For males online dating, disclosure of an autism diagnosis has a negative impact on females with stigmatising views about autism. However, disclosure can also have a positive impact on females who do not hold stigmatising views about autism. This is consistent with previous research as well as anecdotal accounts indicate that highlighting an autism diagnosis does not result in fewer potential dates, rather more suitable dates.

423.215 (Poster) The Influence of Older Siblings on Language Development from Toddlerhood through Adulthood Among Individuals with ASD and Non-Spectrum Developmental Delays

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Background: Language development is heterogenous across autistic people and impacts a myriad of adaptive outcomes (e.g., long-term well-being, academic performance, and vocational independence; Friedman et al., 2019). While research among typically developing youth consistently highlights a linguistic advantage for first born children (Nafissi, Z., & Vosoughi, 2015), a dearth of studies has explored this possibility among autistic youth. One cross-sectional study suggests that the effect of birth order on language milestones may not apply to autism (McFayden et al., 2022). However, previous longitudinal studies have shown that older siblings serve as positive models of behavior to supplement skill development for autistic people (Rosen et al., 2022). Therefore, further research is needed to determine the potential longitudinal effects of older siblings on language development in autism.

Objectives: Among people with autism or non-spectrum delays, this study examined (1) whether the presence of an older sibling influenced expressive language from early childhood through adulthood and (2) if effects were moderated by individual-level factors (i.e., NVIQ, ASD diagnostic status).

Methods: Participants included 253 individuals with ASD or non-spectrum developmental delays longitudinally assessed from ages 2 through 25. The Vineland Adaptive Behavior Scales (VABS) expressive language age equivalents (EXP), Autism Diagnostic Observation Schedule (ADOS) overall level of language (OLL) (adjusted across modules), and Autism Diagnostic Interview-Revised (ADI-R) verbal communication (VC) items were administered between 6–9 times. Participants also completed standardized IQ measures. Growth curve modeling with individually varying times of observation was conducted. For aim 1, sibling variables (dummy coded with “has an older sibling” as the reference group) were regressed on the latent intercept and slope. For aim 2, interactions between sibling variables and proband factors (NVIQ and diagnostic status) were tested.

Results: Parameter estimates are presented in Table 1. Across all three language measures, having autism or lower NVIQ was related to less language initially. Lower NVIQ was also related to slower language development over time. Those with an older sibling demonstrated slower language gains over time than only children on the ADOS-OLL. Sibling effects on initial level of language demonstrated interactions with NVIQ and ASD status on the VABS-EXP and ADOS-OLL. Having an older sibling (vs only younger siblings) was
related to less initial language on the ADOS-OLL, but only for those without autism, and to less initial language on the VABS-EXP, especially for those with lower NVIQ. No effect of siblings emerged on the ADI-VC.

Conclusions: Our finding that having older siblings is related to less expressive language and slower language development over time is consistent with the Resource Dilution Theory (RDT; Nafissi, Z., & Vosoughi, 2015), and in contrast to the positive effects of siblings on skill development in autism more broadly (e.g., Rosen et al., 2022). According to RDT, the presence of an older sibling necessitates greater sharing of resources and parental attention. These effects may be specific to expressive language structure (VABS and ADOS) vs pragmatic use of language (ADI). Those with older siblings may benefit from additional linguistic support throughout their development.

423.216 (Poster) The Interagency Autism Coordinating Committee Strategic Plan: Guiding Research, Services, and Policy Activities across the Autism Community
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Background: The Office of Autism Research Coordination (OARC) of the U.S. National Institutes of Health (NIH) will present updates on recent activities of the Interagency Autism Coordinating Committee (IACC) and the upcoming 2021-2022 IACC Strategic Plan for Autism Research, Services, and Policy.

OARC/NIH coordinates and manages the IACC, a federal advisory committee composed of federal officials and public stakeholders (researchers, self-advocates, clinicians, and family members) representing the many perspectives that make up the autism community. The current IACC membership reflects the largest and most diverse Committee to date. The Committee was established by Congress to coordinate federal agency activities and to provide advice to the Secretary of Health and Human Services (HHS) related to autism spectrum disorder (ASD). The IACC’s Strategic Plan provides a framework and serves to guide the activities of U.S. federal agencies and partner organizations by outlining priorities and directions for autism-related efforts. The Strategic Plan is one of the main ways the IACC provides advice to the HHS Secretary and includes recommendations that address research, services, and policy activities.

Objectives: OARC will present background information about the IACC and a description of the latest updates to the IACC Strategic Plan, which serves as a guide for federal agencies and partner organizations on autism-related activities in the U.S.

Methods: The IACC Strategic Plan is developed through a consensus process by the IACC, with input from the public in the form of public comments and a special Request for Information. The IACC considers the current autism research, services, and policy landscape, and discusses what topics should be prioritized to maximize positive outcomes for individuals on the autism spectrum. The Strategic Plan is approved by the IACC through a majority vote, and the document is published and used by federal agencies and other community members.

Results: The 2021-2022 IACC Strategic Plan for Autism Research, Services, and Policy is organized around seven topic areas, each of which is associated with a community-based Question and has a dedicated chapter. The seven topic areas are: Screening and Diagnosis (Question 1), Biology (Question 2), Genetic and Environmental Factors (Question 3), Interventions (Question 4), Services and Supports (Question 5), Lifespan (Question 6), and Research Infrastructure and Prevalence (Question 7). Each Question area includes three Recommendations; there are also two Cross-Cutting Recommendations, one focused on sex and gender differences in autism and one on disparities and equity in autism. The Strategic Plan also includes a section on the impact of the COVID-19 pandemic on the autism community and key lessons to be learned. Also included is a budget recommendation and high priority topics for research identified by the IACC. The full Strategic Plan will be free to download and available to the public on the IACC website: https://iacc.hhs.gov/publications/strategic-plan/2022

Conclusions: The 2021-2022 IACC Strategic Plan for Autism Research, Services, and Policy provides advice and recommendations to the HHS Secretary on autism-related issues related and provides a framework to guide the autism research, services, and policy efforts of U.S. federal agencies and partner organizations.

423.217 (Poster) The Missing Voice: A Comparison of Autistic Adults and Inclusive Employers Perspectives of Work Readiness Skills Needed to Enter the Calgarian Workforce
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Background: To successfully enter the workforce, young adults need to be ready, willing, and able to work. Work-readiness is defined as having the basic job and life skills needed to maintain employment. Research has described the construct in various ways, with current theories primarily identifying two to six common employer-reported clusters of skills required for one to be work-ready and successful in
the workplace. Researchers have additionally reported that individuals with disabilities who graduate from high school are often unequipped with the skills necessary to enter the workforce. One such (neuro) disability, autism (spectrum disorder), has troublesome statistics, with a low percentage of individuals entering the workforce after graduating high school in Canada. In Canada, autistics have one of the lowest labor force participation among those with developmental disabilities. Although service providers have sought to improve these employment statistics through work-readiness programs to bridge the gap in the skills needed to enter the workforce by consulting with stakeholders such as experts and employers, autistic voices have largely been absent.

Objectives: This study investigated autistics’ and inclusive employers’ perspectives of work readiness and how to improve it for autistic individuals. Two questions guided this study: (1) How do autistic individuals’ and inclusive employers’ opinions of work readiness compare to current research on work readiness? and (2) What are autistic individuals’ and inclusive employers’ opinions about how we can improve work readiness in autistic individuals?

Methods: In a qualitative design, eight semi-structured interviews (five autistics and three inclusive employers) were conducted with employers and autistics from Calgary, Alberta, Canada. Interviews were transcribed, and data were analyzed via reflexive thematic analysis.

Results: Four themes arose from the autistic viewpoint: (1) Holistic perspective of work readiness; (2) Work readiness is not a static concept; (3) Work readiness consists of position-dependent skills; and (4) Increasing work readiness for autistic individuals. Additionally, four themes resulted from the employer viewpoint: (1) Work readiness includes a holistic view of the person; (2) Work readiness consists of the same standards with adjustments; (3) Work readiness consists of position-dependent skills; and (4) Improving work readiness for autistic individuals.

Conclusions: The current study provides a glimpse into the autistic and inclusive employer perspectives of work readiness (i.e., beliefs and components), and how work readiness can be improved for autistic individuals. The findings of this study fill a gap within the literature by exploring how autistics and inclusive employers understand work readiness, which skills should be taught within work readiness programs, and how to improve work readiness for autistic individuals. The perspectives, skills, and strategies outlined within this research can be used as a springboard for stakeholders to understand work readiness from multiple perspectives. Further, this study can inform practice by allowing researchers and other stakeholders to know the areas to focus on to improve employment odds for autistic individuals and potentially influence policy to break down employment barriers for autistic individuals.

423.218 (Poster) The Networked Village: How the Ecosystem of Support and Emotion Around Autistic Youth Shapes Independence during the Transition to Employment


Background: Over 66% of young adults with Autism Spectrum Disorder (ASD) are disconnected from opportunities for work or schooling in the first few years after high school. Unequal access to social capital (resources and connections) from work, community and school contexts could adversely impact their transition to employment and other life course outcomes. Our study used qualitative methods to investigate the social support networks of transition-age youth with autism during transition.

Objectives: To identify key themes about the social support networks of autistic youth in extended high school using qualitative methods with the youth and their ecosystem of support at home, school and the community.

Methods: A purposeful sample of young autistic adults in extended high school (N=4), their caregivers, teachers and community providers (N=13) were asked to participate in semi-structured qualitative interviews about the youth’s transition experiences. A total of 22 interviews (N=13,530 words) were conducted, transcribed, coded and analyzed. Qualitative analysis was implemented across three stages. The precoding phase utilized deductive concepts (derived from the semi-structured protocol which was based on prior research findings) and emergent, inductive concepts (derived from qualitative data from interviews that were not related to the protocol, which were then compiled into a thematic database using R-programming to cluster summaries by theme. Summary memos were drafted based on the precoding data base. A code book, including 10 top codes and 22 subcodes, was derived from the precoding memos (see Table 1). During stage 2, coders reaching reliability (>70% agreement with master coder on at least 2 tests) on the codebook before participating in a systematic process of double coding (20% of all data was doubled coded with joint reconciliation) and solo coding using NVIVO. All codes and associated text were then extracted from NVIVO and, during Stage 3, analyzed through iterative memo writing and small group analysis meetings using thematic analysis.

Results: Two main findings were identified including (1) how emotional processing impacted social capital during the transition to employment and (2) the impact of ecosystems on the social production of independence for youth during transition (see Figure 2). Emotional dynamics among network supporters operated by a three step process. Step 1 included observations of youth transitions experiences by ecosystem members. Step 2 involved self and joint management of emotions by ecosystem supporters. Step 3 was characterized by the successful access of instrumental resources by supporters with durable ties that could support emotional processing and the lack of instrumental resources for supporters with weak ties where emotional processing resulted in mistrust and misunderstanding.
(see Figure 1). The social production of independence varied for autistic youth where some youth were embedded in re-made ecosystems characterized by strength-based and accommodating interactions, organizational and institutional supports and inclusive norms, while others experienced traditional ecosystems characterized by isolated, mistrusting ecosystem supporters, organizational silos and ableist norms (see Table 1).

Conclusions: The ecosystem of emotional dynamics for autistic young adults is rarely studied and new findings can help shape future interventions designed to address inequalities for autistic youth.

423.219 (Poster) The Perceptions of Teachers on the Critical Skills Required for Primary School Transition in Singapore
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Background:

The transition to primary school is a challenge for children with autism spectrum disorder (ASD) (Kemp, 2003). In Singapore, transition support is implemented either by parents, preschools or early intervention centers. The differences in their perceptions, resources, knowledge and skill levels would affect how they plan and implement transition support (Choy & Karuppiah, 2016). In a society which values academic success, the focus of preparation is typically on academic competencies.

Objectives: The study aimed to understand teachers’ perceptions on the critical skills required for primary school transition in Singapore.

Methods:

The transition questionnaire comprises 73 skills derived from literature. The items were reviewed by seven educational psychologists for face validity and categorized into: Communication, Self-help, Social, Adaptability, Classroom, Transition, Fine Motor and Academic. Respondents were asked to rate the importance of each skill for transition using a five-point, Likert-scale ranging from 1 (not important) to 5 (must have). The survey was hosted on a secure online form builder platform. After approval from the institution’s ethic review board, the survey link was sent to the authors’ personal contacts who forwarded the link to the potential respondents via email and social media. Through this snowball sampling method, preschool teachers, early intervention educators and primary school teachers were recruited to complete the anonymous survey from July 2021 to May 2022. Data were analysed using the Statistical Package for Social Sciences (SPSS) software and a one-way ANOVA used.

Results:

121 (male=8, female=113) participants completed the survey. The ethnic makeup of the respondents mirrors the racial proportion in Singapore. 25.6% of the respondents were Preschool teachers, 29.8% were Early intervention educators, while 32.2% were Primary school teachers. 12.4% were in occupations working with special needs children.

As shown in Figure 1, three toileting related skills were rated as the most important skills for transition. At the category level (shown in Figure 2), transition skills (what children need to do to change from one activity to another, such as locating the school bus line) were ranked as the most important skills.

The three groups of respondents rated differently on the importance of communication (F= 3.495, p< 0.05), fine motor (F= 4.982, p< 0.05), and academic skills (F = 4.951, p< 0.05) for transition. Post-hoc tests indicated that preschool teachers rated communication (p = 0.014) and academic skills (p =0.01) as more important than early intervention educators. Preschool teachers also placed higher value on fine motor skills than primary school teachers (p = 0.028). Compared to preschool and early intervention educators, primary school teachers rated the communication skills as more important skills required for transition.

Conclusions:

The findings shed light of teachers’ perceptions on the critical skills required for primary school transition. The current local emphasis on academic preparation needs to shift toward training of self-help and transition skills. The discrepancies in perceptions among the different groups of teachers highlights the need for a unified transition checklist to be used by various stakeholders and the need for further work on alignment to ensure continuity of support.

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Background:

Genetic or biological factors (biogenetic factors) are popularly perceived to be the causes of autism. According to the biogenetic explanation model (Kvaale, Gottdiener, & Haslam, 2013), although these uncontrollable factors may reduce the blame on individuals, these may also inadvertently hinder social inclusion by priming people to think that autism is unchangeable and conforming to stereotypical images (e.g., autistic people are dangerous). The model also predicts that biogenetic explanation may exacerbate stigma through essentialist thinking, which is the belief that social categories have a fixed and identity-determining essence. It is critical to understand the mechanism of how biogenetic explanation of autism may impact people’s attitudes towards autism.

Objectives:

The aim of the present study was to test the biogenetic explanation model in autism by investigating the relationships between biogenetic explanatory factors, essentialist thinking, perceived dangerousness, prognosis expectation, and social distance toward people with autism.

Methods:

247 laypeople without professional experience with autism (62.9% female) aged 18 to 60 years participated in this study via an online panel in Hong Kong. Participants completed questionnaires about casual attribution (to what extent participants believed each factors cause autism), essentialist thinking (to what extent participants believed autism has a fixed and identity-determining essence), perceived dangerousness (how dangerous people believe interacting with people with autism is), prognosis expectations (how confident people believed people with autism would change with appropriate interventions), and social distance. Exploratory factor analysis (EFA) was performed to determine the underlying structure of participants’ beliefs about ASD causes. Structural equation modeling (SEM) was used to examine the interrelation among target variables.

Results:

Five categories of perceived causes of autism were revealed by EFA, including biogenetic factors, mental health factors, physical factors, volitive/religious factors, and maternal factors. Figure 1 illustrated the SEM results and the final model with estimated coefficients. The goodness of fit of the model was satisfied ($\chi^2(289) = 501.11$, RMSEA = .06, GFI = .917, TLI = .906, SRMR = .06). The mediation coefficient was found to be significant for perceived dangerousness ($\beta = -.12$, $p = .035$) and prognosis expectation ($\beta = -.45$, $p = .001$). The direct effect of essentialist thinking on social distance was not significant ($\beta = -.07$, $p = .594$). These results suggested the more people believe that autism is a fixed group, the more people perceived individuals with autism are dangerous and cannot be improved, which in turns leads to increased social distance.

Conclusions:

However, the more laypeople believed in biogenetic explanation, the lower level of essentialist thinking was found. Future research is needed to explore whether other factors (e.g., diversity appreciation) may be associated essentialist thinking about autism even though laypeople deeply believe autism is caused by biogenetic factors. Decreasing essentialist thinking will be beneficial to promote social inclusion because people would see the possibility of changes in people with autism and diversity of autistic personhoods.

423.221 (Poster) The Relationship between Maternal Optimism and Transition Outcomes in Young Adults with and without Developmental Disabilities


Background: Transition to adulthood can be a stressful time for all parents, but particularly so if their young adult child has a developmental disability (DD). The loss of eligibility for services after high school places a greater burden on parents of youth with disabilities to provide help and support during this time, often impacting parental wellbeing. Previous research has shown that mothers of youth with autism spectrum disorder (ASD) and intellectual disability (ID) experience greater parenting stress and mental health problems compared to parents of typically developing (TD) youth (Blacher & Baker, 2017). Research has identified various protective factors for parents caring for children with disabilities, including dispositional optimism, or generalized positive expectancies about future outcomes (Carver & Scheier, 2014). The relationship between maternal wellbeing/optimism and young adult transition outcomes has yet to be examined.
**Objectives:** This study examines maternal wellbeing and optimism during adolescence as predictors of young adult transition outcomes among youth with ASD, ID, and TD participating in a longitudinal study.

**Methods:** 109 young adults ages 20-25 [ASD=23, ID=33, TD=53] and their mothers completed questionnaires and interviews at two time points (adolescence and young adulthood). Mothers’ stress and mental health, perceived impact of the child on the family, and dispositional optimism were assessed at youth age 13 or 15 using mothers’ reports on the Symptom Checklist (SCL), Family Impact Questionnaire (FIQ), and Life Orientation Test (LOT), respectively. Overall young adult transition outcome (Transition Outcome Composite; TOC) was coded on a 0-9 scale based on youth and parent responses to interviews and questionnaires regarding employment, education, independence, and socialization. A multiple linear regression was conducted to examine maternal wellbeing variables in adolescence and youth diagnostic status (i.e., TD or DD) as predictors of young adult outcomes on the TOC.

**Results:** Results revealed that transition outcomes in all areas were significantly poorer for young adults with ID or ASD (all \(p < .001\)). In both adolescence and young adulthood, mothers in the TD group reported lower parenting stress and mental health symptoms and higher optimism, compared to mothers of young adults with ASD and ID. Interestingly, higher maternal optimism in adolescence predicted more successful young adult transition outcomes on the TOC, regardless of the youth’s diagnostic status \( (p < .05\). Mothers’ mental health and perceived impact on the family did not predict young adult outcomes when controlling for diagnostic status and optimism.

**Conclusions:** Consistent with previous research, young adults with ASD and ID had poor transition outcomes. In addition, their mothers reported considerable mental health symptoms and stress, as well as lower optimism and perceived positive impact of the youth on the family. Nonetheless, young adults whose mothers were more optimistic during adolescence were more likely to have successful outcomes in adulthood, regardless of the youth’s diagnosis. Findings suggest that parental attitudes are likely to impact youth transition outcomes. Thus, maintaining an optimistic outlook may be especially important for parents of youth with disabilities. These findings reflect the importance of harnessing positivity early on to foster more positive young adult outcomes.

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**423.222 (Poster) The Role of Parental Emotion Regulation on Child Behaviors in Autistic and Other Developmentally-Disabled Children during the COVID-19 Pandemic: Mediation By Dysfunctional Parent-Child Interactions**

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**Background:** During times of heightened stress, such as the COVID-19 pandemic, children’s adjustment may be especially dependent on their parents’ ability to manage emotions and cope with stress themselves (Shorner & Liebovich, 2020). Notably, parental difficulties in emotional regulation (ER) have been linked to increased child internalizing and externalizing behaviors (Zimmer-Gembeck et al., 2021). Prior research suggests that parents of autistic children engage in more maladaptive ER strategies (e.g., self-blaming, catastrophizing) compared to parents of non-autistic children (Megrey et al., 2020). Despite the suspected effects of parental ER on child adjustment, these relationships have not been studied in families with developmentally- and intellectually-disabled children (DD/ID) children.

**Difficulties in parent ER have also been linked to increased parenting stress and less positive and collaborative parent-child relationships (Hu et al., 2019; Shaffer & Obradovic, 2017).** Further, parenting stress and parent-child relationship quality may be a driving force for child psychological outcomes (Brock & Kochanska, 2015; Osborne & Reed, 2009). Thus, parental stress, specifically concerning parent-child interactions, may mediate the effects of parental ER on child outcomes. Moreover, better understanding these relationships may indicate ways to better support DD/ID children and their parents, especially following the COVID-19 pandemic.

**Objectives:** The current study investigated the impact of parental ER on child behaviors and explored the mediating effects of parent-child dysfunction in a diverse sample of families with DD/ID children during the COVID-19 pandemic.

**Methods:** Participants included 40 parents (87.5% female; 60% Non-White; 80% aged 35-54) of DD/ID children (72.5% autistic; mean age=11.60 years, SD=5.62; 77% male). Parents completed measures of parental ER (DERS; Gratz & Roemer, 2004) and parenting stress (PSI-4; Abidin, 1995), which includes the Parent-Child Dysfunctional Interaction (PCDI) subscale. Parents also reported on their child’s overall behavior (Maladaptive Behavior Index of the VABS-III; Sparrow et al., 2016).

**Results:** Child behaviors were positively correlated with difficulties in parental ER \((r=.423, p < .01)\) and overall parenting stress \((r=.749, p < .001)\). Further, the PCDI subscale was positively correlated with parental ER \((r=.431, p < .01)\) and child behaviors \((r=.657, p < .01)\). Parental ER significantly predicted child behaviors \((B_{max}=.217, p < .01)\). Mediation analysis indicated a significant indirect effect of parenting stress between parent ER and child behaviors \((B_{indirect}=-.189, 95\% \text{ CI } [.07, .38])\). Similarly, a significant indirect effect of PCDI subscale fully mediated the relationship between difficulties in parental ER and child behaviors \((B_{indirect}=-.125, 95\% \text{ CI } [.03, .28]; \text{ Figure 1})\). Parental ER and PCDI accounted for 45.9% of the variance in child behaviors, which was statistically significant, \(F(2,37)=15.7, \ p < .001\).

**Conclusions:** These findings highlight an important mechanism through which difficulties in parental ER may relate to DD/ID child behavior. Crucially, they contextualize findings about the relationship between parent ER and child behaviors by underscoring the mediating role of parenting stress, including stress concerning parent-child interactions, in predicting child behavior. Given the proximal
role of family processes on DD/ID children’s well-being, teaching parents adaptive strategies for managing emotions and stress reduction, especially during times of unusually high stress, may be an important avenue for improving parent-child relationship satisfaction and thus minimizing children’s risk for challenging behaviors.

423.223 (Poster) The Scholarly Neglect of Black Autistic Adults in Autism Research
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Background: Although we know about disparities in Black autistic children, little research has focused on the experiences of Black autistic adults. Most of what we know about autistic adults is based on the experiences of white participants. In the U.S., autism is most commonly diagnosed and validated by medical professionals’ observations and/or parent reports. The traditional medical model of autism identification often fails to account for culture, and introduces concerns related to healthcare provider and measurement bias. As a result of identification biases, Black autistic children, adolescents, adults, seniors, and their families experience disproportionate systemic barriers to services and unmet mental healthcare needs compared to white peers. Estimates suggest that nearly 5.4 million autistic adults live in the United States, yet Black autistic adults are largely missing from lifespan and disparities research. Researchers have begun to document disparities in Black autistic children, however, few sources accurately capture how these disparities translate into adulthood. For example, Black autistic adults experience unmet employment support needs and experience higher unemployment than white autistic adults. This lack of scholarship—the neglect of Black autistic adults in autism research—contributes to limited knowledge about the strengths, celebrations, joys, barriers, and needs of Black autistic adults.

Objectives: Following this presentation, attendees will be able to: (a) describe how Dis/ability Studies and Critical Race Theory (DisCrit) theories help to contextualize Black autistic adults’ experiences, (b) identify disparities that persist among Black autistic adults, and (c) implement practical guidelines to engage in more inclusive research with Black autistic adults.

Methods: The purpose of this conceptual paper presentation is to (a) use intersectionality and Dis/ability Studies and Critical Race Theory (DisCrit) theories to contextualize Black autistic adults’ experiences, (b) describe the systemic disparities that contribute to the scholarly neglect of Black autistic adults, and (c) provide guidelines to support researchers in moving from neglect to inclusive research with Black autistic adults. Our research team included racially, gender, and neuro-diverse researchers who represent a broad range of diversity of lived experiences and expertise.

Results: While this is not an exhaustive list of potential contributors of neglect, we argue that systemic disparities and methodological issues have had a cumulative impact on Black autistic individuals. Implicit racial biases continue to permeate across social systems despite explicit racial discrimination being illegal. Black Americans view their encounters with social institutions through a racial lens that is informed by past and current experiences of racial discrimination.

Conclusions: First, we recommend that researchers work to understand how their own perspectives, values, and experiences shape their research (e.g., cultural reciprocity). Second, we recommend that researchers intentionally include the perspectives and experiences of Black autistic adults. This can include collaborating on research with Black autistic scholars and highlighting autistic and Black autistic led research. Finally, we advocate for systemic changes in institutions of higher education (e.g., reduce barriers to admission) and in communities (e.g., culturally responsive supports) to better address the inequities that impact the representation of Black autistic adults in autism research.

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Background: Although previous research assessing the behavioral and emotional functioning of typically-developing (TD) siblings of children with autism spectrum disorder (ASD) has been frequently mentioned in the ASD literature, studies including more than one informant are scarce. Furthermore, studies focusing on TD siblings in middle childhood and using a parent-report and a self-report behavioral screening instrument are extremely limited, while no such study exists in the Greek cultural context.

Objectives: The present study aimed to explore possible discrepancies between parent and siblings self-report in the Strengths and Difficulties Questionnaire (SDQ).

Methods: The sample consisted of 118 TD sibling-parent pairs (98 mothers and 20 fathers) with a child with ASD in their family. Both parents and siblings completed a demographic questionnaire, and the 118 school-aged siblings were 9 to 13 years old. Parents were administered the parent version of the SDQ and the TD siblings answered the self-report children’s version of the SDQ.
Results: Initial results using the Wilcoxon signed rank test showed that the median scores in the parent and child versions of the SDQ were found to be comparable concerning the total score and the scores on almost all subscales of SDQ except for the ADHD subscale. In the ADHD subscale, the parental score was clearly higher than the child’s score. In addition, the mean difference was close to zero for most of the SDQ subscales. It is noteworthy that there was not a clear pattern of either overestimation or underestimation on behalf of the parent compared to the siblings’ report. In some cases, it was the parent that perceived the children’s state as worse whereas in roughly the same number of cases it was the child itself that did so. In the Presocial and Emotions subscales of SDQ, the agreement and consistency scores were high for the siblings and parent scores while in the ADHD subscale the highest disagreement and inconsistency was found between parents’ and siblings’ score.

Conclusions: This study addresses an important gap in the literature in relation to the assessment of behavioral functioning of TD siblings of children with ASD. The results highlight the importance of utilizing both parent- and self-report measures when examining TD siblings’ behavioral functioning in order to ensure that the gathered information is reliable and siblings of children with ASD are appropriately supported in their developmental trajectory.

423.225 (Poster) The Use of Parent-Focused Supports during Parent-Implemented Early Autism Intervention

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Background:

Parents of young children with early autism symptoms tend to experience elevated stress and reduced well-being. Parent-focused supports, including problem-solving approaches, have been shown to improve parent coping skills, decrease parenting stress, and prevent depressive symptoms. Many early autism interventions train parents to deliver evidence-based strategies to their children in natural environments. To better support parents as they take on active roles in their children’s intervention, it is important to understand types of problems they face and the helpfulness of added parent-focused supports.

Objectives:

Among parents who were being encouraged to implement evidence-based strategies with their children, we sought to understand the types of problems that parents chose to focus on when provided with a parent-focused support called Problem Solving Education (PSE). Additionally, we aimed to explore parent perspectives on the use, helpfulness, acceptability, and feasibility of PSE alongside parent-implemented early autism intervention.

Methods:

Primary care providers referred families of young children (18-to 24-months old) with concerns for early autism symptoms to a larger NICHD-funded ACE ACTION Network study on individual and combined effects of two evidence-based interventions: 1) Problem-Solving Education and 2) the Early Social Interaction (ESI) parent coaching model. Family Navigators delivered PSE to participating parents (n = 45; see Table 1 for sociodemographic factors), who had access to online resources on how to incorporate ESI strategies into everyday activities. Families were randomly assigned to also receive individualized coaching with the ESI Model. PSE sessions were delivered with a mean fidelity score of 92.0%. Family Navigators recorded the content of all PSE sessions on a structured form following each PSE session, including a description of the problem addressed.

We used a mixed methods explanatory sequential study design. We developed a coding structure to categorize PSE problem descriptions based on 1) who the problem was about and 2) the nature of the problem. Two coders independently coded problems with inter-rater agreement of 92.4%. Next, 13 parents completed a standardized questionnaire of intervention acceptability and feasibility and a semi-structured qualitative interview. We used applied thematic analysis to identify themes from the qualitative interviews.

Results:

Approximately half of the problems were about the child and half were about the parent or nuclear family (see Figure 1 for additional details). The most common type of child-related problem had to do with addressing behaviors and supporting development. The most common parent/family-related problems surrounded household management, parental emotional well-being, and parent education and employment. Key qualitative themes included that PSE was useful for addressing any type of life stressor, encouraged self-care, and complemented the process of learning ESI strategies (see Table 2 for qualitative results). Overall, parents agreed that PSE was acceptable to them (m = 4.0 on a scale of 1 [completely disagree] to 5 [completely agree], SD = 0.84) and feasible to use (m = 4.2, SD = 0.8).

Conclusions:
Our combined quantitative and qualitative findings suggest that PSE provided a beneficial space for parents to further support their child’s development, as well as to manage other stressors in their lives.

**423.226 (Poster) To Create or Not to Create?: For Some Autistic Adolescents, There’s Very Little Question**


**Background:** Research on autism and creativity has yielded mixed results; while some research suggests enhanced creativity in autistic people (Kasirer & Mashal, 2014; 2016), other research suggests diminished creativity (Cassella, 2010; Takeuchi et al., 2014). However, research has rarely examined if autistic people benefit from, and how they feel about, creative engagement more generally and in terms of specific projects.

**Objectives:**

1. Assess whether autistic students feel they benefit from creative engagement generally, and if so, how.
2. Compare perceived benefits of creative engagement more generally and creative engagement in a 4-week game design and employment workshop.
3. Examine whether general or workshop-specific benefits are impacted by type of workshop activity and divergent thinking skills (a proxy for creative potential; Runco & Acar, 2012).

**Methods:**

22 autistic students participated in a 4-week game design and employment workshop delivered by an informal technology education nonprofit (Mage = 16.82). Pre-workshop, students completed a measure of divergent thinking (AUT; Silvia et al., 2008). During the workshop, students made video games and personal websites. Post-workshop interview questions included:

1. Does working on creative activities benefit you? Why or why not?

*After indicating which project they focused on most during the workshop:*

1. Why did you decide to make this particular project?
2. What did you gain from making this project?

Two raters inductively coded responses after obtaining inter-rater reliability >80% agreement on 20% of the data.

**Results:**

When explaining if and how creative activities more generally benefit them, students reported benefitting from creative engagement (90.9%) with enjoyment/fun as their primary gain (27.3%; Table 1). Students reported technical skills as their primary gain from working on a tech-focused creative project in the workshop (47.6%; Table 2). Common reasons for pursuing workshop projects included being inspired by certain workshop topics (31.8%) and platforms (22.7%) and a desire to build new skills (13.6%).

Increasing positive affect was only cited as a benefit of general creative engagement (13.6%) and not creative engagement in the workshop. Students who chose to make a personal website were more likely than students who created video games/other projects in the workshop to cite building creativity mindset (i.e., “it teaches me to be creative”) as a benefit to general creative engagement, $p = 0.034$, and functionality as a reason for making their project, $p = 0.031$. Divergent thinking scores were not related to the project students chose to focus on in the workshop or reported benefits of general and workshop-specific creative engagement, $ps > 0.082$.

**Conclusions:**

Autistic students overwhelmingly reported that creative engagement is beneficial. While enjoyment/fun was a general and workshop-specific gain, students most commonly described building technical skills as the primary gain of workshop-specific creative engagement.
These findings suggest that general creativity may be beneficial for wellbeing, whereas tech-focused creativity may be beneficial for learning skills or gaining experience in a related domain.

Programs for autistic adolescents which seek to effectively build skills through creative engagement should consider the creative motivations of the students during curriculum development and delivery.

423.227 (Poster) Understanding Stress and Mindfulness in Parents of Children with Autism
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Background: Due to the symptom set which may be present in some children with autism and many time demands for appointments, care, or other services, parents raising a child on the autism spectrum may experience more significant chronic stress than parents of neurotypical children. Family functioning may therefore be affected, perhaps influencing the well-being of the family as a whole and as individuals.

Objectives: The purpose of this study was to investigate methods of measuring chronic stress in parents of children with autism and to consider the usefulness of mindfulness as an intervention to reduce stress levels by way of an online training program. This was a longitudinal study meant to determine if mindfulness practice by parents leads to improvements in stress coping mechanisms in both groups of parents; those raising autistic children and those raising neurotypical children.

Methods: Our sample consists of 43 families, 24 of whom have at least one child with autism, and 19 families with children and no known relatives with autism. All families needed an infant/toddler between 8 and 15 months to begin the study (i.e., the proband). Probands were age and sex matched for the infants in the ASD sibs’ group (M = 21.2; SD = 6.7). The study is longitudinal, but here we report on phase 1. Phase 1 included collecting a hair sample from a primary caregiver and the completion of questionnaires designed to assess level of stress and wellbeing of the parent and/or the family. Approximately one month of chronic stress is captured in 1 cm of hair. We collected a pencil width of hair from the nape of the neck of the primary caregiver. We also asked parents to complete a self-compassion (mindfulness) course. 27.12% participated, though only 13.56% completed the course, with the most common reason for not completing being a lack of time to devote to the course.

Results: Findings from questionnaires indicate higher levels of perceived stress in parents of children with autism, based on the experienced frequency and demand of their daily hassles and parent stress index (PSI) scores. Analysis of hair cortisol concentration indicated more variability in means for levels of cortisol present in parents of children with autism compared to parents of neurotypical children, perhaps indicating more stress experienced day-to-day by some of these parents. This difference in stress was exacerbated by low SES, suggesting a lack of resources for parents and families with children on the spectrum.

Conclusions: Parents of children on the autism spectrum experience more chronic stress than parents without children with autism, as evidenced by self-report and hair cortisol. Results suggest a continued need for research to improve the well-being of parents of children with autism to reduce their stress levels significantly. Because parents did not participate in mindfulness at a high rate, our lab is investigating other methods of meeting the needs of parents.

423.228 (Poster) Use of Autistic Self-Report in Autism Research: A Systematic Review of Literature Published in 2021
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Background: Autism research has historically relied on proxy reports (i.e., from parents, teachers, or other adults). Yet, autistic individuals contribute unique perspectives not captured by proxy reports (Ferenc et al., 2021; Keith et al., 2019; Kenworthy et al., 2022; Santore et al., 2020). As such, it is crucial to include autistic self-report in research, including from individuals with varying verbal and communication support needs (DePape & Lindsay, 2016; Nicolaidis et al., 2019). It is not yet known how often autistic self-report is incorporated within recent literature nor the methodologies used to capture autistic voices.

Objectives: To identify the frequency of autistic self-report in recent literature and subsequently to describe the methodology and participant demographics of these efforts, with exemplars for incorporating autistic perspectives in future research and practice.

Methods: A systematic review of the autism literature published in 2021 (online first or in-print) was conducted following PRISMA guidelines. Included articles (n=2322) were coded (>80% IOA) according to study demographics, broad topic area, and journal type.

Results: Autistic self-report was included in 18% of studies (n=423), with an additional 25% of studies (n=523) not reporting if respondents were autistic. Autistic self-report was most frequently included in articles about lifespan experiences/quality of life and inclusion/acceptance (54-60% included) and was infrequent (3-11%) in articles on the topics of autism mechanisms/biology, traits,
Using Cognitive and Behavioral Science to Facilitate COVID-19 Vaccination for an Autistic Adult

Background: Autistic adults and their caregivers frequently report barriers accessing medical and psychiatric care in community settings, despite high rates of co-occurring conditions like anxiety and specific phobia. Trypanophobia, an intense and persistent phobia of needles, limits access to essential immunizations and has been especially concerning during the COVID-19 global pandemic. Despite cognitive and behavioral science holding promise to improve vaccination rates for autistic adults, medical personnel rarely receive training in specific intervention strategies to support patients with trypanophobia, underscoring the importance examining collaborative efforts between cognitive-behavioral therapy (CBT) trained clinicians and medical providers when caring for autistic adults in community clinics.

Objectives: To explore the utility of implementing CBT interventions to facilitate vaccination for an autistic adult with trypanophobia in a community clinic.

Methods: A 26-year-old autistic male, “AP”, presented to a sensory-friendly vaccination clinic in July 2022 (dose 1) and August 2022 (dose 2) with his mother. AP was diagnosed with ASD, without co-occurring intellectual/language impairments, as a child and noted that trypanophobia prevented several previous attempts to obtain COVID-19 vaccine. Following a brief history, a licensed psychologist with expertise in ASD and anxiety implemented strategies from the Facing Your Fears manual (Reaven et al., 2011) to facilitate the vaccination process and a family medicine physician administered the vaccination. Steps of AP’s fear hierarchy included: 1- Look at needle in package; 2- Vaccine rehearsal on stuffed animal; 3- Roll up sleeve/prep arm for vaccine; 4- Needle out of package, with gradual cues from AP to move needle towards injection site; 5- Vaccine administered in arm, when AP cued “Go”. AP also created a “Plan to Get to Green”, which outlined specific strategies to facilitate somatic management and cognitive restructuring as the needle approached his arm: 1) Take deep breaths 2) Listen to relaxing music 3) Remember helpful thoughts (“I can handle this.”; “I am in control.”) 4) Say “closer” each time I’m ready for the needle to move towards my arm 5) Tense fists tightly before signaling “Go” for vaccine in my arm. Throughout this graded desensitization process, AP identified his subjective units of distress scale (SUDS) with the psychologist and physician guiding fear hierarchy progression collaboratively, based on AP’s SUDS feedback.

Results: AP was successfully vaccinated at both visits, with dose 1 session duration=90 minutes of intervention/support and dose 2 session duration=60 minutes of intervention/support.

Conclusions: This case study illustrates that CBT interventions in community clinics can facilitate access to essential medical care for autistic adults. During a post-clinic interview with AP & his mother, they noted that despite seeking specialized vaccination services for over 20 years, AP was unable to receive vaccinations elsewhere due to lack of accommodation for autistic patients with trypanophobia. AP and his mother noted that the most helpful aspects of this clinic included the flexibility, patience, and collaboration demonstrated by the clinicians throughout both sessions. Future directions include examining the efficacy of specialized medical clinics for autistic individuals and the feasibility of incorporating CBT-trained clinicians into inpatient and outpatient medical care settings.

Using Experience Based Co-Design and Design Thinking to Improve the Accessibility and Inclusivity of Research for Autistic Individuals with Complex Support Needs.

Background: Autism and other developmental disabilities are underrepresented groups. Journals of autism, education, or disabilities (20-23%). Journals of the highest frequency of articles that included autistic self-report were from the fields of child/family development, neuroscience, medicine, and other practitioners (e.g., speech, social work, OT/PT). Descriptives for participant demographics in studies that included self-report will be presented (e.g., gender, race/ethnicity, SES, IQ), as well as exemplars for future work.

Conclusions: Fewer than 20% of autism studies published in the last year follow literature recommendations to include autistic self-report in research. Another quarter of studies did not report if respondents were autistic, which was largely due to lack of characterizing parents or professionals according to neurotype. Autistic-self report is more frequently included in studies examining lifespan experiences and autism inclusion, suggesting that literature on these topics may best align with the views and experiences of autistic people. Articles on the topics of autism mechanisms, traits, assessment, and family/provider experiences, as well as from journals in the fields of child development, neuroscience, medicine, and other practitioners had the lowest rates of autistic self-report and would be enhanced by doing so. Participant demographics and exemplar studies will be used to inform recommendations for including autistic self-report in future work, including for underrepresented groups.
Background: Autistic people with complex support needs (ACSN) remain underrepresented in research (Russell et al., 2019), partly because of challenges adapting research procedures and methods effectively to accommodate diverse needs (Maes et al., 2020). For example, in recent literature reviews of studies claiming to involve ACSN (Donald et al., in prep; Edwards et al., in prep) we found that participants are often excluded when perceived to be unable to cope with, or understand, task demands; rarely were adjustments to research procedures or methods reported to maximise participant inclusion. Collaborating with the community concerned is critical to ensuring that research procedures and methods are adapted appropriately so that research effectively and meaningfully meets diverse needs.

Objectives: We aim to show how Experience Based Co-Design (EBCD) and Design Thinking (DT) methodologies provide effective frameworks for involving the communities concerned in the co-development of more accessible and inclusive research practices to serve ACSN.

Methods: EBCD has been used in healthcare settings to improve care pathways for patients together with patients (Donetto et al., 2014). It involves a cyclical process that begins with capturing the experiences of everyone concerned through formal observations and interviews that are combined into so-called ‘Touch-Point videos’. These videos are then shared in co-design meetings to stimulate discussion of the changes needed to improve services. These changes are implemented and subjected to further observation. Similarly, DT brings together stakeholder communities to co-develop solutions for complex challenges, involving an iterative process of design and review (Brown, 2008). We are adapting these methodologies to work in partnership with autism researchers, school professionals, children, and their families in order to co-develop improvements in how research answers questions meaningfully about language and communication functions and the communication of distress in ACSN. Specifically, we are exploring how best to adapt standardised assessment tools of verbal (e.g., BPVS) and non-verbal (e.g., Ravens) ability, as well as procedures for collecting psychophysiological data.

Results: Key findings to date include the co-development of multi-modal project information resources that supplement typical information sheets to facilitate engagement with frequently marginalised groups (e.g., those with English as an additional language). In addition, school professionals and parents have been involved in co-designing touch-screen based adaptations to traditional assessment tools by advising, for example, on the inclusion of symbol-based instructions to improve accessibility. Autism researchers working in the field have also been candid about their experiences working with ACSN, offering suggestions for adapting research practice and methods. We are continuing to gather the experiences of multiple stakeholder communities about being involved in this research and will share ‘touch-point videos’ detailing these experiences, as well as further adaptations and tools emerging from the work.

Conclusions: Adopting co-design methodologies positively shapes research procedures and tools to be more accessible and inclusive for ACSN and other marginalised and under-represented groups. Adapting research processes in collaboration with communities ensures researchers remain reflective of how well suited their research practices are to answering questions most important to those communities.

423.231 (Poster) Using Sentiment Analysis to Study Attitudes Towards Autism in the UK Press 2011-2020
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Background:

The press reflects constructs and reconstructs public attitudes towards a range of social categories, including autistic people. A recent study (Karaminis et al., 2022) investigated the portrayals of autism in the UK press between 2011-2020 using quantitative and qualitative methodologies from the fields of corpus linguistics and critical discourse analysis. One of the key findings was that newspapers tended to highlight adversities associated with autism and used negative language when referring to autistic people. This bias was more pronounced in tabloids than broadsheets, and in right- than left-leaning newspapers, and also tended to decrease slightly over the years.

While corpus analysis offers valuable insights into attitudes expressed in texts, which are useful for advocacy and public policy, it is a cumbersome and time-consuming approach. Computational linguistics offers alternatives that may automate these analyses. For example, the so-called pre-trained sentiment models are off-the-shelf tools that may be applied to identify asymmetries and changes in attitudes towards autism. However, the validity of these methods is unknown.

Objectives:

In this study, we aimed to apply computational sentiment analysis methods in the corpus of UK newspapers to assess attitudes towards autism and autistic people in different newspapers and over time. We aimed to establish how the computational results compare to the original study.

Methods:

We used the Autism UK Press corpus, a collection of ~24K articles relevant to autism published in ten national newspapers between 2011-2020. We performed sentiment analysis on every article of the corpus considering three alternative models: Vader, Flair and TextBlob. For
each model, we generated average sentiment measures [0 = negative; 0.5 = neutral, 1 = positive] per newspaper type (broadsheets vs. tabloids or left vs. right-leaning) and per year. As a baseline, we performed sentiment analysis on a reference (non-autism relevant) corpus of similar makeup to the Autism UK Press Corpus.

Results:

We present results from the FLAIR model, however, similar patterns can be seen in all three sentiment models. Overall, the mean sentiment score was lower in the Autism UK Press Corpus (average= 0.35) than the reference corpus (average = 0.43), indicating that British newspapers expressed relatively negative sentiments when referring to autism. Furthermore, and consistent with the original study, the sentiment towards autism was more negative in tabloids (0.32) than in broadsheets (0.37) (Figure 1) and in right-leaning (0.33) compared to left-leaning (0.38) newspapers (Figure 2). This pattern was unique to the autism corpus, as differences were, indeed, in the opposite direction in the reference corpus (right panels). However, there were no systematic differences in sentiment expressed in texts referring to autism over the years, unlike the original study.

Conclusions:

The results of the automated sentiment analysis were consistent with the original study on asymmetries related to reporting style and political orientation; but did not show changes over time. We conclude that sentiment analysis methods have potential to measure sentiment towards autism in the Autism UK press. Further improvements might be possible by using models tuned into this corpus.

423.232 (Poster) Variables Predicting Autistic Identity and Its Impact on Wellbeing

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Background: Positive autistic identity can protect against depressive symptoms and promote mental health and wellbeing (Cooper et al., 2017; Mainland et al., 2021). Autistic identity and other identity-related constructs like self-compassion, self-acceptance, and pride are associated with increased autism knowledge (Hickey et al., 2018; Lewis, 2016), greater alignment with neurodiversity perspectives (Kapp et al., 2013), lower stigma (Cooper et al., 2021), and higher levels of outness and disclosure (Cage & Troxwell-Whitman, 2020). Understanding how these variables relate to each other and predict autistic identity development can highlight pathways to supporting wellbeing.

Objectives:

1. To identify whether (a) autism knowledge, (b) orientation to neurodiversity perspectives, (c) stigma consciousness, and (d) outness predict variance in autistic identity when controlling for gender, sexuality, and number of years knowing about autism.
2. To determine if autism identification mediates the effect of stigma consciousness on mental wellbeing.

Methods: 169 autistic adults ranging in age from 18 to 61 years ($M = 29.92$ years) completed an online Qualtrics survey composed of measures indexing autistic identity, autism awareness and knowledge, alignment with neurodiversity perspectives, autism-related stigma consciousness, level of outness about being autistic, and mental wellbeing. Hierarchical regressions determined the degree to which the four variables of interest (autism knowledge, orientation to neurodiversity perspectives, stigma consciousness, and outness) are associated with autistic identification (Objective 1). A mediation analysis addressed Objective 2.

Results:

1. Multiple hierarchical regression models with iterations of block two are examined (Table 1). In all models, gender, sexuality, and number of years knowing about autism were entered into the first block as controls. For models 2-5, each predictor variable was entered in block two and significantly predicted autistic identity (Autism knowledge - Model 2; Neurodiversity perspectives - Model 3; Stigma consciousness - Model 4; Outness - Model 5). In Model 6, all four variables were simultaneously entered into block two to determine which variable(s) uniquely explain autistic identity.

See Figure 1 for the mediation analysis. In the presence of autistic identity, the direct effect of stigma consciousness on wellbeing was negative and significant ($b = -2.215, t(169) = -2.243, p = 0.026$). The total effect of stigma consciousness on wellbeing was negative and not significant ($b = -0.907, t(169) = -0.998, p = 0.320$). The indirect effect of stigma consciousness on wellbeing via autistic identity ($ab = 1.079$) was positive and significant, with confidence intervals not including zero (CI = [0.407 – 2.340]).

Conclusions:
Alignment with neurodiversity perspectives uniquely predicted positive autistic identification suggesting that agreement with the neurodiversity paradigm and its positive/neutral views of autism promote autistic identity development.

Greater consciousness of autism-related stigma had a positive relationship with mental wellbeing via autistic identity. Findings suggest that the effect of positive autistic identity may outweigh the negative influence of stigma consciousness on wellbeing.

Implications include how supporting autistic identity development through increased autism knowledge, orientation to perspectives of neurodiversity, stigma consciousness, and outness can positively influence mental wellbeing in autistic adults.

423.233 (Poster) What Are Autistic’s Housing Preferences and Needs? - a Descriptive Study
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Background: In Canada, rental housing is often too expensive for modest incomes. This is of greater concern for Autistic adults, whose financial resources are often lower than those of the general population. Meanwhile, although they live in the same material world as allistic (non-autistic) people, Autistics perceive and experience their environment differently and many characteristics common to built environments are problematic for them. A mismatch between the person's needs and the characteristics living environments can impact both his or her health and well-being.

Objectives: To document Autistics’ preferences and needs in terms of independent private rental housing (i.e., without community support or supervision) to: i) establish a portrait of Quebec Autistic adults in relation to housing; ii) explore the needs and preferences of Autistics tenants in terms of rental housing.

Methods: Initiated in partnership with a real estate developer, this participatory study, which was led by an autistic researcher, brought together four autistic citizens and one (other) non-autistic researcher. The study consisted of a mixed concurrent (quant + qual) online descriptive study, launched between November 1, 2021, and March 7, 2022. To take part in the study, participants needed to be Autistics (≥ 18 years of age) living in Quebec at the time of the study and capable of completing the online survey, offering an introspective perspective of their preferences and needs regarding independent private rental housing. Participants completed an electronic questionnaire (Sociodemographic = 8 questions; Current living situation = 11 questions - measuring scale; Preferences and needs = 1 open qualitative question). Quantitative data were subjected to descriptive statistical analyses (percentage, average, standard deviation) while qualitative data were subjected to content analysis.

Results: 64 Autistic adults participated in the study (M:34.5 years old; SD:9.7), a little more than half of which being female (56%). 78% of the participants reported being tenants (mostly in non-subsidized rental housing – 64%). Only 4% of participants reported that their current home was fully aligned with their preferences and needs, with 49% considering it to be moderately to not at all aligned with their preferences and needs. Characteristics reported as necessary for rental housing to meet the rental housing needs and preferences of participants were organized into 16 themes, the most recurrent of which involving soundproofing, lighting, proximity to services/public transportation, pet ownership, and proximity to nature.

Conclusions: Results show that the most frequently mentioned needs and preferences were in the sensory sphere, which is not surprising. As most participants indicated that their current housing situation was not aligned with their needs, it appears that Autistics living in independent housing (i.e., without supervision) are frequently forced to live in environments that cause sensory overload or require increased adaptation. The characteristics highlighted in this study call for rethinking the way Autistics’ needs are approached and embracing macro and mesosystemic environmental levers (e.g., rethinking construction standards for rental buildings or regulating sensory accessibility standards in the same way as physical accessibility standards) - moving away from individual levers of intervention, which are currently the most common.

423.234 (Poster) What Do You Mean I Have Autism? Perspectives of the Impact and Lived Experiences of Individuals on the Autism Spectrum Being Uninformed of Their Diagnosis
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Background: Many autistic individuals complete a diagnostic assessment as minors, with parents often serving as translators of the outcomes of the assessment with their child. Parents frequently struggle to decide whether to tell their child about the diagnosis as there are considerable stereotypes and stigma associated with the label of autism, and parents often associate this when receiving the diagnosis from clinicians; considerable time and thought go into the decision of whether to disclose the information to one’s child.

Objectives: The current study investigated the lived experiences of autistics who were not informed of their autism diagnosis for at least one year after parents were informed of the outcome of assessment.
Methods: A qualitative methodology was implemented utilizing semi-structured interviews. Interpretive phenomenological analysis was conducted to understand autistics’ perceptions, experiences, and opinions on nondisclosure of their autism diagnosis.

Results: Six North American participants between the ages of 22 to 27 took part in semi-structured interviews. Six group experiential themes (Misleading Perceptions; I Did Not Know I Was Autistic; Negative Outcomes of Nondisclosure; Wait, I have Autism?; Now I know, Now I Can; and Earlier the Better) emerged from cross-case analysis of individual themes. Each group experiential theme highlights first-person perspectives regarding the difficulties of diagnostic nondisclosure and benefits of receiving information.

Conclusions: The current study appears to be the first to give voice to autistics regarding a highly debated decision of whether to disclose or not disclose an autism diagnosis through investigating their lived experiences of nondisclosure of their diagnosis. This study generated new knowledge surrounding ethical considerations diagnosticians should be wary of in diagnostic assessment feedback and the interplay of guardians as translators of information leading to false hope and belief.

423.235 (Poster) “I Am My Child’s Voice”: Exploring Parents’ Advocate Roles As They Navigate School-Based Services for Their Autistic Child
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Background: In the U.S., many parents of autistic children that receive school-based services are heavily involved in their child’s education (Wagner et al., 2012). Unfortunately, many parents report not receiving the school-based services they feel their child needs (Suhrheinrich et al., 2021) or experiencing a lack of communication with school providers (Tucker & Schwarz, 2013). Further, families with marginalized identities (e.g., immigration status, socioeconomic status) face barriers in accessing interventions for their autistic child (Bishop-Fitzpatrick & Kind, 2017; Zuckerman et al., 2017). A need therefore exists to examine how the parents of autistic children—especially those with marginalized identities—navigate the transition to school-based services in the U.S.

Objectives: To explore parents’ goals and motivations as they navigate the transition from early intervention (EI) to school-based services for their autistic child. We explore these in a sample of parents in Boston, Massachusetts, most of whom are first-generation immigrants, non-native English speakers, and/or living at/below the state poverty line.

Methods: Participants were parents (N=22) of three-year-old children diagnosed with autism through an EI-based, multistage screening study. Parents were mostly women (n=18), first-generation immigrants (n=13), non-native English speakers (n=13), and/or living at/below 185% of the Massachusetts state poverty line (n=16). Parents completed follow-up interviews about their children’s services at age 39 months and completed a two-session motivational interviewing (MI) intervention focused on parent-school engagement, in which parents and their MI clinician co-constructed action plans that outlined the parents’ goals and reasons for these goals. In a mixed-methods approach, we analyzed the parent action plans using Braun and Clarke’s six-step thematic analysis approach (Braun & Clarke, 2022) and examined parents’ service satisfaction using descriptive statistics.

Results: Results are based on data from 14 participants (analyses for others are underway). In rating their child's school services, 64% of parents were satisfied or very satisfied with school services; 50% were satisfied with school communication. However, qualitative results suggest that all parents, regardless of satisfaction level, identified multiple areas for improvement. Emerging themes (italicized) showed that in navigating school-based services for their autistic three-year-old children, parents wanted more communication and collaboration with school-based providers and identified wide-ranging, daunting goals and shortcomings regarding their child’s services. Some parents’ goals were motivated by a desire for progress in their child’s development, and others by a desire for their child to have a happy, meaningful, and autonomous life. Overarching themes highlight parents’ view of themselves as advocates or champions for their child.

Conclusions: Our research highlights the tremendous role that parents of autistic children take on in navigating school-based services in the U.S. Even in the context of parent-reported satisfaction with children’s school services, parents described carrying out intensive roles in advocating for and ensuring these services. Further, in this sample of predominantly multiply-marginalized families, our findings highlight the need for better parent-school communication and support for parents of autistic children as they navigate the transition into school-based special education services. This need may be particularly relevant for parents with marginalized identities who already face barriers to accessing care.

423.236 (Poster) “I Think of It As a Curse Gift”: Predictors of Autism Understanding in Autistic Teenagers

Background: Parents may wait to tell a child they are autistic until they feel the child is “ready,” leading some autistic people to learn they are autistic years after their diagnosis (Smith et al., 2018). Parents often express concerns that their child will not understand the diagnosis, that it could confer stigma, and/or harm their child’s mental health. However, learning one is autistic earlier is associated with better mental
health in adulthood (Oredipe et al., 2022) as talking openly with children about autism promotes self-understanding and coping (Crane et al., 2021). Indeed, autistic adolescents whose parents talked to them openly about being autistic tended to describe themselves and autism more positively than peers whose parents had not voluntarily told them they were autistic (Riccio et al., 2020a). While emerging research has begun to outline clear benefits of talking openly with children about autism, little remains known about how characteristics of autistic youth may help shape their understanding of autism.

Objectives: To examine if the following factors, identified by the autistic lead author as likely predictors of autism understanding, are associated with heightened autism understanding: a) parental disclosure of autism; b) cognitive skills (fluid intelligence, perceptual abilities, and verbal reasoning; because youth may use these skills to determine if they have autism and what it means); c) self-determination; and d) age.

Methods: Autistic youth (N = 37) in a game design workshop completed the Self-Determination Inventory-Student Report (Shogren et al., 2018), game-based cognitive assessments (Cambridge Brain Sciences) and answered interview questions, including: “What is autism?” and “What do you think autistic people like and do not like about being autistic?” Parent surveys included the question, “What have you told your child about their diagnosis/diagnoses?” After obtaining inter-rater reliability, coders coded open-ended responses.

Results:

Greater deductive reasoning was associated with greater likelihood of stating one is autistic when asked what autism is, \( r(34) = .34, p = .045 \). Youth whose parents had disclosed to them were less likely less likely to struggle defining autism, \( r(27) = -.44, p = .02 \), and older, \( r(30) = .48, p = .006 \). Higher self-determination was associated with less difficulty defining autism, \( r(34) = -.33, p = .046 \), but greater likelihood of misconceptions, \( r(35) = .36, p = .03 \).

Autistic students with ADHD had less difficulty defining autism, \( r(24) = .56, p = .003 \), but more often described challenges, \( r(25) = .47, p = .01 \).

In their descriptions of what autistic people like and do not like about being autistic, students commonly described autism as a difference that could lead to discrimination (Figure 1).

Conclusions: How autistic people come to understand autism is shaped by the interplay between individual differences and how others talk to them about autism. Autistic adolescents are acutely aware that autism is a difference from others, though how they interpret this difference varies greatly. Future research should evaluate individually and culturally-adapted strategies to help autistic youth understand autism.

423.237 (Poster) “Let Them Show What They Can Do”: Parents’ Perspectives on Strength-Based Practices for Autistic High School Students

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Background: Although there is emerging evidence to support leveraging the strengths and interests of autistic students, there is a lack of research on utilising strength-based practices to support autistic students in the school environment. The experiences of parents supporting their autistic child navigating through their educational journey have been underrepresented in the research. There is a need to understand the lived experiences of parents to facilitate the development of strategies to provide positive educational journeys for autistic individuals.

Objectives: This study aimed to explore the experiences of parents of autistic adolescents regarding strength-based practices in secondary schools.

Methods: A phenomenological research methodology was chosen to address the objective of this study. Semi-structured interviews were conducted with 23 parents (21 mothers and 2 fathers) of autistic adolescents (21 males and 2 females) who were either in secondary school (N=18) or had completed secondary school within the last five years (N=5) at the time of the interview. The interview examined the overall experience of parents in supporting autistic adolescents in their schooling and specifically explored strength-based practices. Interviews included probing questions exploring participants’ perceptions, thoughts, and feelings. Transcripts were analysed following seven-steps proposed by Coliazi for phenomenological analysis.

Results: Analysis of interview transcripts revealed that parents perceived a limited use of strength-based practices for autistic adolescents in secondary schools. Parents experienced challenges and sought resources and support in navigating through the system with their autistic
Background: In England majority of students with special needs could not attend school during the pandemic. School closures were difficult for all, but especially for autistic children who likely rely on routines. With the closure of schools, caregivers did not voluntarily choose homeschooling and many children were out of education. The Covid-19 pandemic offered a unique opportunity to understand the schools' support level for home learning and to understand how we can improve the homeschooling experiences for the children and their caregivers. Most of the research available was carried out with a quantitative approach. There are limited qualitative studies focusing on the experiences of caregivers regarding their children's homeschooling experiences.

Methods: A qualitative approach is adopted in this study. An online open-ended questionnaire was conducted so that the parents can type their own words whenever they want without time limitation. Photographs reflecting homeschooling experiences were collected as secondary data. Nine parents of twelve school age autistic children who live in England (6 mothers and 3 fathers) participated in the study. The questionnaire included demographic questions and 15 open-ended questions. The online questionnaire was available from January to March 2021. The responses to these open-ended questions were analysed by thematic analysis.

Results: A total of four themes, comprising 10 subthemes were identified. The primary themes were a) resources and support (received resources and support from school, external support and resources, quality of support and resources, support need areas), b) homeschooling experiences (caregivers’ experiences, children’s experiences), c) impact of Covid-19 pandemic on outcomes of autistic children (academic skills, speech, language and communication skills, mental health and motor development) and d) strategies of caregivers to support autistic children. Caregivers stated that the resources and support provided by schools were available during the homeschooling process but were either not appropriate or not sufficient. 8 of 9 participants emphasized that their experiences were difficult by using the word “terrible”, and they felt incompetent. Moreover, changes in academic, social, communication and mental health of children were stated.

Conclusions: It is important to examine this issue in order to discover how adequate the existing educational services are for autistic children and to help develop the support and programmes to be provided in the future period of homeschooling. This study provides insight into areas of need for overcoming inequalities in education and highlights negative effects on these caregivers’ wellbeing and autistic children's outcomes as well as gaps in the supports that were available. More useful support is essential from a variety of sources for caregivers to support their wellbeing and be able to support their children at home. Also, schools should be empowered to meet needs of autistic children.
Objectives: To address this limitation, the current study aimed to deliver a qualitative study asking autistic children how they perceive a social robot, JD.

Methods: This exploratory study was the second phase of a larger project titled ‘Evaluating the Usability of Social Robots for use in Learning Emotion Recognition in Autism Therapy with Children.’ The first phase involved developing several games with the aim of gamifying emotion recognition support with the small humanoid robot, ‘JD’. Focus groups were held with 14 autistic children across various settings in regional and metro areas in Western Australia to capture their opinions of JD. Participants’ age ranged from 7 to 12 years (M = 10.07; SD = 1.82), with 12 participants identifying themselves as male and 2 as female. All participants had previously received an autism diagnosis. The focus group questions were developed to capture the opinions of autistic children about their initial impressions of robots and JD, JD’s physical characteristics (appearance and operation), and preferred games and stories when interacting with JD. Several prompts tailored to each child were provided during the session. The researchers ensured they avoided leading responses or prompts to support the participants while enabling them to answer the questions in their own time. The focus group sessions were audio recorded and then transcribed verbatim. Data was analysed via NVivo® 20 and guided by the Thematic Analysis Approach suggested by Braun and Clarke (2007).

Results: Through thematic analysis, two main categories emerged, child-related and JD-related. The child-related category was informed by the children’s prior personal experiences with robots, including initial impressions, involvement preference in robot-related stories and narratives and their interest in technology (e.g., gaming, computing, and coding). JD-related category captured the children’s impressions and interactions with JD during the focus group session, including its aesthetic appeal, physical operation and movements, robotic technology as an assistive tool, children’s willingness to directly interact with JD, and its utility across therapy, school, and other contexts.

Conclusions: Along with informing future improvements for JD, the findings of this study indicated that to develop a robot that maximises engagement with autistic children, developers should consider children’s previous experiences and their favoured features of robots. Future research would benefit from exploring autistic children’s experience of robots when used within a therapy context.

423.240 (Poster) “You Need to Meet People Where They Are”: Autistic Adults’ Mental Health Therapy Experiences

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Background:

Autistic adults commonly experience significant co-occurring mental health problems, including depression, anxiety, and suicidality. As such, there is an urgent need for effective mental healthcare for this population. Although outpatient psychotherapy is considered a first-line treatment for depression and anxiety, few studies have explored autistic adults’ personal experiences with mental health therapy. Understanding the perspectives of autistic adults is essential for gaining insight into the factors that may facilitate a positive therapeutic experience.

Objectives:

This study explored the perspectives of autistic adults regarding their overall mental health therapy experiences. A qualitative approach was selected to reveal unanticipated insights into the aspects of therapy that are most and least helpful for autistic adults.

Methods:

Autistic adults (n=303, ages 21-77) completed an online survey of their mental health therapy experiences. Participants were recruited through the Simons Foundation Powering Autism Research for Knowledge (SPARK) Research Match process. Items assessed prior mental health diagnoses, experiences with therapy, and therapist characteristics. Those with therapy experience responded to two open-ended questions: “What have you found to be most helpful in therapy?” and “What have you found to be least helpful in therapy?” Descriptive statistics were calculated for key variables. An iterative qualitative content analysis approach was used to analyze open-ended responses.

Results:

Most participants (89.1%) had been diagnosed with a mental health condition, with depression (74.9%) and anxiety (74.3%) being the most common. Most (88.8%) had previously participated in therapy for mental health issues and had worked with a psychologist (69.3%). Regarding how much their therapist knew about autism, mean ratings across professional disciplines ranged from 3.07 to 3.41 (on a scale of 1 = no knowledge, to 5 = a great deal of knowledge). Most (66.5%) participants felt that it was “very important” (5 on a scale of 1 to 5) for their therapist to know a lot about autism. Regarding overall therapy experiences, qualitative analyses revealed 4 primary themes and 9 subthemes. Autistic participants reported that therapist acceptance and understanding are critical for therapy success (Theme 1), and many noted that therapy has offered them tools for personal growth (Theme 2). However, communicating in session (including expectations for
talking about feelings) can be challenging for many autistic adults (Theme 3), and aspects of the session format (such as structure, organization, and alternative activities) can help or hinder their progress (Theme 4).

Conclusions:

The results of this study indicate that factors related to the therapist, the autistic client, and the therapeutic approach likely interact to influence therapeutic outcomes. Many autistic adults found therapy to be helpful for personal growth, particularly in helping them to process issues, gain new perspectives, and develop greater self-understanding. Notably, it was especially important to participants that their therapists understand autism and work to create an accepting and validating therapeutic relationship. The results also revealed the importance of ensuring that therapy sessions are individualized to accommodate the communication, information processing, and sensory needs and preferences of autistic clients.

423.241 (Poster) A Systematic Review and Meta-Analysis of Associations between Primarily Non-Autistic People’s Characteristics and Attitudes Toward Autistic People

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Background: There has been increasing research on non-autistic people’s attitudes toward autistic people. Such research has often focused on identifying characteristics associated with their attitudes, purportedly to facilitate the development of effective autism trainings. The degree to which such research is rooted in theory and measurement practices for assessing rater characteristics may impact the utility of previous studies as a foundation for trainings. However, no systematic review has synthesized prior literature on non-autistic people’s characteristics associated with attitudes toward autistic people.

Objectives: This systematic review consists of narrative synthesis and meta-analysis. The narrative synthesis aimed to understand which characteristics have been measured in relation to attitudes toward autistic people, focusing particularly on the theoretical frameworks used and the internal consistency of the instruments utilized to assess raters’ characteristics. The purpose of the meta-analysis was to identify whether raters’ age, gender, quality and quantity of contact with autistic people, autism knowledge, and autistic traits were associated with their attitudes about autistic people.

Methods: Peer-reviewed studies that were published in English after 1970 and reported quantitative associations between primarily (at least 90%) non-autistic samples’ self-reported attitudes toward autistic people and at least one characteristic of the participants were included in the narrative synthesis. Two independent coders extracted all relevant information, including the internal consistency of the instruments used to measure participants’ characteristics, and the theoretical frameworks the authors drew upon to motivate testing associations. Types of rater characteristics were inductively categorized into demographic characteristics, knowledge, contact, traits, and ‘other.’ Studies selected for the narrative synthesis were included in the meta-analysis if the authors supplied Pearson’s r between the variables of interest and attitudes and/or the means and standard deviations of attitudes by gender. We conducted unconditional meta-regressions to estimate the effect sizes for attitudes and each correlate using robust variance estimation.

Results: In the 47 studies included in the narrative synthesis, Western and White undergraduate students were surveyed most frequently. Demographic characteristics were the factors most frequently tested, followed by contact-related factors, autism knowledge, and participants’ traits. Internal consistency was not reported for some instruments, some had alpha levels lower than .70, and many characteristics of raters were measured using one-item measures. Moreover, theoretical motivations for investigating the rater characteristics were rarely provided (Table 1). Thirty-seven studies were included in the meta-analysis. Attitudes toward autistic people were associated with gender, autism knowledge, and quality and quantity of previous contact with autistic people, but not with age or autistic traits (Figure 1).

Conclusions: Research examining characteristics associated with primarily non-autistic people’s attitudes toward autistic people often utilized instruments with low reliability and unclearly operationalized constructs, and very few studies provided theoretical motivations for examining associations. Generalizability is limited by over-reliance on primarily western and white participants. These findings indicate a need for more studies that situate their investigation in a theoretical framework, focus on context-related characteristics (e.g., culture and institutional variables such as support/commitment to inclusion), and identify which specific aspects of contact and knowledge about autism improve people’s attitudes.

423.242 (Poster) Ready2Work: A User-Informed Employment Website for Autistic Job Seekers

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Background: Securing meaningful employment is a priority for autistic people in Canada and beyond. While people on the spectrum are motivated to obtain employment, unemployment and underemployment rates remain high. Throughout the existing literature, employment research has focused on individual and social characteristics that influence job-seeking. What remains missing is an empirical investigation of the resources that may support autistic job seekers in locating fulfilling work opportunities. Little is known about what job seekers on the autism spectrum need to locate, apply for, and secure meaningful employment.

Objectives: The purpose of this integrated knowledge translation research study was to 1) understand what autistic job seekers, caregivers, and employment professionals identify as important for job seekers on the spectrum to successfully enter the workforce (Phase 1) and to use these findings to develop and subsequently pilot an online employment platform (Phases 2 and 3).

Methods: In Phase 1, we conducted five focus groups with 29 participants, including seven autistic self-advocates, six caregivers of people on the spectrum, and 16 professionals from vocational and employment organizations about the employment needs of autistic job seekers. We used our findings from the thematic analysis to inform the subsequent employment website’s development (Phase 2) and refinement (Phase 3). After developing the initial beta version of the website (Phase 2), we recruited eight autistic self-advocates who interacted with the first website version and completed a survey containing open- and closed-ended questions about the website (e.g., usability, interface) during research sessions. In the final phase, we incorporated the Phase 2 usability feedback into redesigning the website and recruited 14 participants (n = 7 autistic self-advocates; n = 7 caregivers of autistic job seekers) to test the re-developed website to provide additional feedback. During Phases 2 and 3, we also gathered feedback from two community member consultants.

Results: Phase 1 focus group participants outlined a variety of barriers that autistic job seekers face. Participants provided several recommendations for an online employment site tailored to the needs of autistic people. Phase 2 participants rated the initial website iteration favourably (e.g., n = 7, 87.5% reported the website met or exceeded their expectations; n = 7, 87.5% reported that they would likely re-visit the website for employment resources). Phase 3 participants also reported generally positive ratings of the second iteration of the website (e.g., n = 14, 100% reported it was “easy” or “very easy” to navigate; n = 12, 85.7% reported that they would likely re-visit the website for employment resources).

Conclusions: Findings from our integrated knowledge translation study add to the dearth of information on empirically based resources that support autistic people in pursuing employment. This innovative, evidence-informed approach to developing an online employment resource focuses on engaging end-users and key stakeholders throughout the research process. We embedded community involvement into our model of developing the online platform throughout the study, an area that future researchers might consider when initiating projects intended to serve the needs of a particular community.

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Background: Transitioning to adulthood encompasses many developmental and institutional changes across many life areas. Developmental changes include the shift from childhood to adulthood; institutional changes include the transition from child to adult services. Unique challenges accompanying these changes may be even more pronounced for transition-aged youth on the autism spectrum compared to their neurotypical peers. From a family systems perspective, changes affect not only the autistic youth but also other family members transitioning alongside the teen, in addition to relational adjustments and changes between teens and their family members, namely caregivers. Transitioning Together (Da Walt Smith et al., 2012; Da Walt Smith et al., 2018) is one of the relatively few empirically based programs to support the transition experiences of youth on the spectrum and their families. This 8-week psychoeducational group program focuses on preparing autistic youth and their caregivers for the transition to adulthood. Studies examining the effectiveness of Transitioning Together have indicated promising evidence supporting its positive impact on parent and child outcomes. Further examination into the influence of Transitioning Together on parent-child relational outcomes merits further attention.

Objectives: The purpose of this study is to examine parent-reported relationship quality changes pre, post, and 1-month following participation in Transitioning Together.

Methods: The present study was a pre-post with a 1-month follow-up design delivered across four partnering community agencies involving 17 program facilitators. Twenty-six parent-child dyads completed the study. At study entry, most of our caregiver sample comprised mothers (88.5%; n = 23). Most autistic youth were male (84.6%; n = 22); with a mean age of 15.9 years (14-17; SD = 0.78), and an average Social Communication Questionnaire (Rutter et al., 2003) score of 19.8 (SD = 7.0). Among various parent (e.g., depressive symptoms) and youth (e.g., social functioning) outcomes measured at three time points, we asked parents to speak for five uninterrupted minutes about their child and their relationship with their child (i.e., Five Minute Speech Sample, FMSS; Magana et al., 1986).

Results: All data have been collected. Transcripts are being prepared and reformatted for linguistic analysis using the Linguistic Inquiry and Word Count (LIWC) software (Pennebaker et al., 2015). A repeated measures ANOVA will be used to examine changes in parent-child relationship quality over time with a focus on (1) positive (e.g., warmth, praise) and negative (e.g., criticism, overinvolvement)
relationship indicators, (i.e., past vs. present vs. future-focused narratives) regarding their relationship descriptions. Further, we will examine the relation between our FMSS data and parent and child outcome data.

Conclusions: Our findings will add to the existing literature on relational measures of parent-child functioning. The results may have implications for other family-focused programs during the transition to adulthood for autistic youth and beyond. We will discuss the importance of examining relational variables as a unit of analysis for future family-oriented research.

Background: Controversies regarding the neurodiversity movement (NDM) may be exacerbated by confusion over its meaning. Some critics and supporters of the NDM describe it as identical to the social model of disability (SM), whereas many NDM supporters assert that the NDM, unlike the SM, recognizes both biological and societal contributors to disability (Dwyer, 2022). Calls for the SM to better recognize the complexity of disability further complicate comparisons of the NDM and SM (Crow et al., 1996; Hughes & Patterson, 1997).

Objectives:
1. Compare perspectives on the NDM and SM among autistic and non-autistic stakeholders.
2. Relate beliefs about the NDM and SM to intervention goals.

Methods:
504 stakeholders (276 autistics), 236 family members (95 autistic), 120 professionals (33 autistic), and 100 researchers (41 autistic) provided valid data.

Quantitative measures of perceived appropriateness of intervention goals included the 35-item Autism Intervention Attitudes Scale (AIAS) and single items regarding goals for epilepsy, anxiety, and depression.

Open-ended responses about the meaning of neurodiversity, the NDM and SM, and similarities and differences between the NDM and SM were analyzed thematically; >80% inter-rater agreement.

Results: See Tables 1-2 for common themes. “Neurodiversity” was primarily understood as a factual term, though some understood it prescriptively. The NDM was overwhelmingly described as prescriptive. Autistic participants more often said the NDM promotes thriving and societal reform, while non-autistic participants more frequently saw it as celebrating differences. Most described the SM as attributing disability solely to society, though others spoke of societal-individual interactions.

Many said the NDM and SM share common goals and attitudes and similarly-valenced views of disability. Some said that they saw no difference between the NDM and SM. However, some said the NDM differs from the social model by recognizing medical needs or societal-individual interactions that cause disability.

SM supporters who described the SM as attributing disability to social-construction (n=164) remained open to individual-focused interventions. Their median AIAS ratings at least slightly supported interventions to teach adaptive skills (e.g., interpersonal skills) and cure depression and epilepsy. Moreover, their ratings were similar to those of SM supporters who described the SM as attributing disability only partly to society (n=70). However, those who described the SM as recognizing individual-societal interactions were less enthusiastic about creating more supportive/accessible environments than those who attributed disability solely to society, \( p=.003 \).

NDM supporters who said the NDM endorses, is identical to, or is based on the SM (n=91) and those who described the NDM as diverging from the SM by recognizing societal-individual interactions (n=33) did not generally differ in treatment preferences.

Conclusions: Autistic people, who have been at the NDM’s forefront, were more likely to describe the NDM in terms of substantive efforts to try to make autistic people's lives better, whereas non-autistic people were more likely to describe a more diluted construct, "celebrating diversity." However, participants who attributed disability solely to society in their theoretical perspectives often still pragmatically supported some individual-focused interventions. Thus, while important controversies remain, there may be greater room for agreement on various practical issues than theoretical debates imply.
Panel Discussion — Genetics

206 - Genetic Research in Autism: What Are the Implications and How Should We Involve the Autism Community?

Panel Chair: Tinca Polderman, Clinical Developmental Psychology, Vrije Universiteit Amsterdam, Amsterdam, Netherlands

Discussant: Sander Begeer, Clinical Developmental Psychology, Amsterdam, Netherlands

The goal of this symposium is first providing information on what is currently possible with genetic research in general and in autism specifically, second, providing examples on how to involve lived experience people in this type of research in a meaningful way, and third, providing information on how genetic findings could potentially be used in clinical practice.

206.001 (Panel Discussion) As a Parent of a Child with Autism, Why I Am Setting out to Do a PhD on the Genetics of Autism? M. Morgan and A. Ronald; (1)Birkbeck, University of London, London, United Kingdom, (2)Birkbeck College, London, UNITED KINGDOM

Background:

We are in the midst of a genomic revolution and genetic progress is bringing tangible benefits to many diverse conditions, disorders and diseases across biomedical science. At the same time, accurate understanding of what genetic information does and does not tell us is essential. The reasons for conducting genetic research in relation to each specific condition is essential to both understand and articulate clearly. As a parent of a child with autism, here I highlight why I am setting out to do a PhD on the genetics of autism and what I intend to focus on in order to derive maximum benefit for the autism community.

Objectives:

To outline the benefits that genetic research can bring to autism research specifically and to describe the priorities and aims of my PhD.

Methods:

In this talk, I outline the main benefits that genetic research can bring for the autism community. I explain core concepts and methods, with a focus on common genetic variation, genome-wide association studies, and the current autism polygenic score. I outline what I consider, as a parent of a child with autism as major priorities for the field.

Results:

Autism is a condition that is driven predominately by genetics and so understanding the genetic variance associated with autism is key to understanding what autism is, how to identify autism in its different forms and how to support autistic people in their lives.

The core methods of genetic investigation into autism include identifying genetic variance through genome wide association studies and using the variance identified to construct polygenic scores, identify biological pathways and compare that genetic variance with that discovered for other traits and conditions.

My PhD research priorities are to further develop existing genetic research into autism that suggests that the underlying traits that make up autism are present in everyone to different degrees. This finding supports the idea that the different presentations of autism form part of the natural differences in the neurodevelopment of individuals. By identifying the genetic variance associated with these differences we can better understand not only how and why autism develops in diverse ways in different people but most importantly how to tailor and target support for autistic people. Along with most other psychological traits and psychiatric conditions, autism is rarely the only part of a person’s psychological profile and instead forms a part of a patchwork with other traits and conditions, for example, ADHD. By investigating the genetics of this patchwork we can better understand the way that different traits and conditions combine to create unique individuals with their own strengths and areas where they need support.

Conclusions:
Autism genetics research can be a force for good in helping autistic people and their families and will help demonstrate that it is a natural form of individual difference to be accepted and welcomed by society as a whole.

206.002 (Panel Discussion) Foundations of Trust in Genetic Research: Themes from the Co-Design of the Spectrum 10K Consultation

K. L. Buckle, University of Manchester, Manchester, United Kingdom

**Background:** The Spectrum 10K project was initiated to conduct a Genome Wide Association Study to investigate the genetic and environmental factors contributing to autism and associated health conditions. Although the study was developed in consultation with a range of stakeholder groups, the study’s launch in the summer of 2021 evoked widespread opposition from autistic people. Much of the criticism revolved around fears that the data collected could be used to develop a pre-natal test for autism, leading to selective termination. In light of this response, the study was paused pending a wider public consultation.

**Objectives:** The consultation aims to engage effectively with autistic people throughout its design, delivery, and reporting, thereby answering concerns and determining what modifications may make the study feel safer. Throughout the consultation process, we aim to engage with the widest possible range of autistic people in terms of demographic and cultural diversity, expression of autism, and attitude towards genetic research.

**Methods:** The consultation is conducted by an independent consultancy and engagement organisation, Hopkins Van Mil. It is co-designed with autistic people and their families and consists of three phases: 1) Determine who should be involved, 2) Co-design the consultation; 3) Hold the consultation and make recommendations to the Spectrum 10K research team.

The consultation uses a qualitative participatory methodology. Engagement in the development and co-design process has involved multiple methods to meet a variety of communication needs. These include: live online workshops and individual interviews using video, voice, or text. Additionally, participants have engaged in asynchronous online activities, discussion and polls. The co-design has involved over 120 autistic people, selected from over 400 applicants to represent the widest diversity of demographics and views.

**Results:** The development and co-design of the Spectrum 10K consultation have raised some important themes and considerations for involvement in autism genetic research. Key themes include accessibility, genuine participation, and trust. Co-design participants emphasised that the consultation should be accessible to anyone who wants to participate, including those who don’t communicate in words, and those who are critical of the research. They also emphasised the importance of the consultation resulting in tangible changes in the study. A key outcome of phase 1 was that an autistic person should co-lead the process, which they felt gave credibility to claims of genuine co-production.

Most importantly, a well-conducted consultation builds trust. Trust is founded not only on the current project’s objectives and methods, but also on the perception of the researchers’ past actions. Trust also depends on transparency, which in turn requires clear and effective communication of complex topics to a lay audience.

**Conclusions:** The initial reaction to the launch of Spectrum 10K has demonstrated that genetic research needs to be handled with the utmost care and consideration for the views and priorities of autistic people. Extensive and public engagement and participation throughout the research life cycle are essential. Trust must be built and maintained on a foundation of transparency and genuine involvement of autistic people.

206.003 (Panel Discussion) How to Involve Lived Experience People in Genetic Research in Autism

T. J. Polderman, M. M. Wit and S. Begeer, (1)Clinical Developmental Psychology, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, (2)Clinical, Neuro- and Developmental Psychology, VU Amsterdam, Amsterdam, Netherlands, (3)Clinical Developmental Psychology, Amsterdam, Netherlands

**Background:** In recent years, genetic research in autism has evoked negative voices from parts of the autism community. As a result, the ambitious genetic research project Spectrum 10K in the UK (2021) is currently paused. The basis for the negative responses seemed to relate to anxiety, suspicion, lack of communication and misunderstanding.

**Objectives:** To avoid a similar backlash, we aim to involve lived experienced people in genetic autism research and optimize communication about this research to the public and specifically to participants of the Netherlands Autism Register (NAR), where recently (March 2022) a genetic project has been launched.
Methods:

We use NAR newsletters, the magazine of the Dutch Association for Autism, and the NAR website to communicate as clear and transparent as possible about the goals and execution of the genetic research in the NAR. Also, we established a panel of (parents of) autistic people (N 3 males, 1 female, 1 binary gender, age range 25-55 years old). During biannual 3-hour panel meetings, we educate the panel members on methods and results of genetic research, and update them on new findings in the field. In addition, we ask for feedback and advice on the genetic research in the NAR, and on communication strategies towards the autistic community and the NAR participants specifically. We either implement the panel’s feedback, or clearly explain why implementing the feedback is not feasible. Panel members receive a volunteer fee for their contribution as well as full coverage of their travel costs, for which in turn we expect a 4-year commitment that includes preparation (e.g., read an article, provide feedback on a text) and being present in the biannual meetings, and in general having an active role in the panel.

Results:

NAR members have received the genetic project positively, and no negative voices from the autism community or general public have been heard so far. The response rate of eligible participants to participate in the genetic project is relatively good with ~40%. Members of the panel are positive about the meetings, the reception of their feedback, and they appreciate the educational part as it enhances providing informed feedback on the subject.

Conclusions:

Involving lived experienced people in genetic research and provide communication in a careful and thoughtful way may reduce negative responses such as anxiety, suspicion and misunderstanding of the goals and intentions of genetic research.

206.004 (Panel Discussion) Individual Return of Genomic Results: Ethical Aspects and Barriers to Implementation

J. Zinkstok, Radboud University Medical Centre Nijmegen, Nijmegen, Netherlands

Background:

Genomic research has made enormous progress in the past decades. In the field of psychiatric genetics large-scale genomic studies such as genome-wide association studies (GWAS) have provided important insights into the genetic architecture of psychiatric conditions. These large-scale genomic studies may generate primary or secondary findings that may be relevant to participants. Thus far, it is not common practice to consider return of individual research results to research participants.

Objectives:

We aim to provide an overview of current ethical and practical considerations with respect to returning individual genomics results in clinical practice. We will focus on individual return of polygenic scores (PGS) in general and for autism specifically, and will review existing literature and guidelines.

Methods:

Normative ethical analysis of ethical arguments and empirical data.

Results:

Studies exploring attitudes of participants, psychiatrists and researchers in the field of psychiatric genetics report growing support for the return of individual results. However, it is not current practice to return individual genomic research results and it is unclear what findings should be returned. Reasons not to share individual results include epidemiological (e.g., uncertainty regarding clinical validity of results), practical (e.g., limited capacity to provide clinical counseling by qualified staff in a research environment) and ethical considerations (e.g., concerns that communicating genetic results could increase stigma). While there are indeed good reasons to take a careful approach to sharing individual results, an overly restrictive policy also precludes valuable learning opportunities on how consent should be obtained, how genomic results such as PGS are best communicated and how these are perceived by recipients. In this session we will consider the possibility that studies investigating the return of individual PGS research results may provide a great opportunity to establish evidence-based practices on if and how to return individual PGS, in clinical practice in general and for autism specifically. This evidence may then guide further developments towards clinical use of PGS. Specific research gaps include exploring ways to communicate individual PGS data and understanding the short- and long-term consequences of return.

Conclusions:
Autism-Associated Transcriptional Regulators Target Shared Loci Proximal to Brain-Expressed Genes

S. J. Sanders, Department of Psychiatry, Weill Institute for Neuroscience, University of Oxford, San Francisco, CA, United Kingdom

Background: Hundreds of genes have been associated with ASD, mostly through the detection of rare loss-of-function variants that disrupt the function of one of the two copies of a gene. However, the mechanism by which disruption of these genes leads to ASD symptoms remains elusive. The majority of ASD-associated genes encode proteins that act as transcriptional regulators (TRs), influencing the expression of other genes; these include transcription factors (e.g., TBR1, FOXP1), histone modifiers (e.g., KMT5B), and chromatin remodelers (e.g., CHD8). The genomic targets of these regulatory genes and the transcriptomic consequences of their disruption remain largely uncharacterized, as do their functional relationship to other ASD-associated genes.

Objectives: To assess the extent of shared regulatory targets across ASD-associated genes.

Methods: We selected four TRs for further analysis, based on strong evidence for ASD association, expression during cortical development, evidence of direct binding to DNA, and the availability of reliable antibodies: ARID1B and BCL11A that are both DNA-binding subunits of the BAF (SWI/SWF) chromatin remodeling complex and FOXP1 and TBR1 that are transcription factors. We performed ChIP-seq using antibodies to the proteins encoded by these four genes in developing human cortex and mouse cortex at E15.5 and E18.5. Peaks were integrated ChIP-seq data for H3K27ac and H3K27me3 and ATAC-seq data from equivalent tissues.

Results: We observed substantial overlap in the binding sites of all four TRs, especially within open chromatin regions. The binding of all four ASD-associated TRs within a promoter region was highly predictive of genes with high brain RNA expression and this signature was observed at 96 out of 102 ASD-associated genes. Motif analysis of the shared loci implicated other genes associated with ASD and neurodevelopmental delay, including RFX3 and YY1. Physical interactions between the TRs could underlie the shared binding sites; proximal ligation assays support such interactions between TBR1 and ARID1B, BCL11A, and FOXP1 in the developing mouse cortex. To assess downstream convergent biology, CRISPRi knockdown of ARID1B and TBR1 was performed in cells from mouse cortex. After eight days of culture, neuronal markers were decreased, non-neuronal markers were increased, and transcriptomic signatures correlated with those seen in postmortem brain samples from individuals with ASD.

Conclusions: Analysis of four ASD-associated transcription regulators leads to a model in which their encoded proteins act as components of molecular mechanisms titrated to control gene expression in developing neuronal lineage cells. Like a clock mechanism, many components are essential, and failure of any individual component can impact overall function. Under this model, disruption of any of multiple ASD-associated transcriptional regulator genes leads to a common neurodevelopmental outcome through shared genomic targets, while specificity to ASD and developmental delay is due to a combination of haploinsufficiency and high neuronal expression of ASD-associated target genes during neurodevelopment, making them the most vulnerable to small perturbations in expression.
220.002 (Panel Discussion) Korean ASD-WGS Cohort: Potential Phenotypes for Genetic Studies

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Background:

Genetic studies of autism spectrum disorder (ASD) in the Asian population have been relatively under-explored. Understanding the genetic landscape, as well as the phenotypic structure of diverse ethnicity, might contribute to understanding the underlying mechanisms of ASD.

Objectives:

This presentation aims to demonstrate the neural and behavioral phenotypes that could potentially contribute to the genetic architecture of ASD in the context of whole genome sequencing (WGS) from Korean ASD family cohorts.

Methods:

1. Individuals with ASD, their siblings, and their biological parents are comprehensively evaluated using the standard diagnostic instruments (ADOS-2 & ADI-R) and various measurements for intelligence, nonverbal intelligence, adaptive functioning, executive functions, and emotional/behavioral symptoms.
2. In our first WGS study with Korean ASD simplex families, a total of 813 individuals from 242 families were sequenced. Induced pluripotent stem cell (hiPSC) models were generated from two ASD families for functional characterization of regulatory non-coding \textit{de novo} mutations (DNMs) in regard to three-dimensional chromatic interactions.

Results:

1. A total of 1,220 families (1,220 individuals with ASD, 441 siblings, 2,440 biological parents, mean age of probands 6.82 years, 4.71 SD, 15.7% female, 1,056 simplex and 164 multiplex with typical or broad autism phenotype in more than two family members) have been ascertained for the study.
2. Our previous studies on clinical variables have demonstrated the importance of exploring comorbid conditions and behavioral/cognitive characteristics as phenotypes in genetic studies. 1) Up to 40% of the individuals with ASD reported having motor or vocal tics, and these participants had greater severity in autistic traits and higher IQ than those without tics. 2) Heightened anxiety is correlated with repetitive behaviors, depressive symptoms, compulsion, and adherence in adolescents with ASD (Kim et al., 2021). 3) Distinct visuospatial processing patterns were found in children with ASD, their siblings, and typically developing children (Kim et al., 2021). 4) Savant skills, one of the under-explored phenomena, were found in 21.9% of the individuals with ASD, in which skills related to memory, reading, and visuospatial were most common.
3. In the study by Kim et al. (2022), we observed that non-coding DNMs in chromatin interactions alter the expression of target genes during early neural developmental stages in primitive neural stem cells (pNSCs) derived from hiPSCs. Low intelligence quotient (IQ) levels in ASD might be one of the most specifiable phenotypes, given that non-coding DNMs in chromatin interactions notably contributed to IQ levels in ASD probands.
4. Parental mental health problems were highly represented in our multiplex family samples (70.1% in mothers, 56.8% in fathers). Mental health concerns were not associated with the multiplicity of diagnosis, symptom severity, age, and gender of their offspring but rather with pragmatic language deficits in their spouse ($F(1,178)=7.76$, $p=0.006$).

Conclusions:

A novel cohort for genomic research, based on a rich and deep collection of phenotype information, is actively being collected for ASD simplex and multiplex families. We expect that WGS studies with distinct ethnicity, as well as cultural/linguistic backgrounds, will enhance the diversity of ASD research.

220.003 (Panel Discussion) Whole Genome Sequencing Analysis Identifies Genetic Architecture Underlying Female Protective Effect in Autism Spectrum Disorder
Background:

Sexual dimorphism of autism spectrum disorder (ASD) is well recognized: about 4 times higher prevalence in males and more severe phenotypes in female cases. A female protective effect (FPE) has been suggested, which assumes that females have a higher liability threshold for being ascertained as ASD, thus largely protected from ASD risk. However, the existing genetic architecture of ASD has failed to capture FPE robustly. Immunological studies have implicated the evidence of sex-biased immune dysregulations in ASD etiology. Incorporating polygenic risk for immune marker into genetic risk of ASD may provide a finer resolution for sex differences in ASD to unravel the genetic mechanism underlying FPE.

Objectives:

Our study aims to evaluate the combined effects of rare variants and polygenic risk of ASD-associated variants and how they correlate with each other and with clinical phenotypes sex-differentially. We further explore polygenic risk for inflammation and immune related markers and its interaction with clinical phenotypes in ASD males and females.

Methods: We analyzed whole genome sequencing (WGS) of Korean ASD-WGS cohort (657 families; 2,186 individuals) for rare and common variants. We prioritized gene-disruptive variants including loss of function (LoF) and damaging missense (MIS) for de novo (dnDIS) and rare inherited variants (inhDIS) and measured enrichment of these variants for ASD status and sex. We computed polygenic score (PS) for ASD- and immune-associated markers for Korean ASD-WGS cohort as well as ancestry-matching general population obtained from the Korean Variant Archive (KOVA) v2 WGS cohort (n=1,891). For Korean ASD-WGS, we calculated a polygenic transmission disequilibrium test (pTDT) score for PS_{ASD} and PS_{MM} and computed a composite rare variant risk score (RVRS) with dnDIS and inhDIS, and PS for pTDT_{ASD} and pTDT_{MM}. Finally, we assessed the correlation between the genetic factors of RVRS and PS and between all genetic factors and clinical phenotypes in males and females.

Results: Our WGS study found significant enrichment of de novo LoF (dnLoF) and PS_{ASD} for ASD cases. ASD females showed higher burden for dnLoF and PS_{ASD} compared to ASD males. Similarly, maternal transmission of inhDIS was significantly enriched for ASD males, suggesting greater genetic burden in female. While ASD-associated variants were enriched in females, PS_{MM} was shown to be higher in ASD males. This sex difference was not found in control siblings or general population. Comparing with phenotypic and behavioral traits, we did not find any sex-specific enrichment for dnLoF or PS_{ASD}. However, PS_{MM} showed a female-biased negative correlation with RVRS but male-biased positive correlations with core ASD symptoms.

Conclusions:

Our result supports FPE and demonstrates that sex-differential genetic architecture confers a distinct susceptibility towards a wide spectrum of ASD phenotypes. We also show that polygenic risk of immune traits can improve the interpretation of FPE model in ASD.

220.004 (Panel Discussion) Novel Bioinformatic Techniques Reveal Link between Sex-Specific Genome Regulation in the Developing Human Brain and Developmental Delay-Associated Genes in an Ancestrally Diverse Population

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Background:

Autism spectrum disorder (ASD) is 3-4X more commonly diagnosed in males than females, a fact that is currently unexplained. While cultural differences in how ASD is perceived in males and females likely influence diagnostic rates, multiple lines of evidence suggest that individuals with comparable genetic liability are less likely to develop ASD phenotypes if they are female. Sex differences in genome
function, including gene expression and splicing, may contribute to this female neuroprotective effect, but mechanistic understanding is hampered by limited knowledge of how sex affects gene regulation during neurodevelopment.

Objectives:

We aimed to identify genomic loci associated with sex-differential gene expression or splicing (expression or splicing quantitative trait loci, xQTLs) in developing human cortex tissue, and to assess identified loci and genes for association with ASD. We also aimed to improve both the resolution and patient relevance of xQTL discovery by utilizing an ancestrally diverse pangenomic reference for variant calling and personalized reference genomes for allele-specific expression estimates.

Methods:

We utilized a previously published dataset of bulk RNA-seq and whole genome DNA sequences (WGS) from the dorsolateral prefrontal cortices (DLPFCs) of 81 human donors (38 male, 43 female; 14-21 post-conception weeks). To account for samples’ diverse ancestries, we mapped WGS short reads to the draft human pangenome, identified common structural variants and short tandem repeats (PanGenie and ExpansionHunter), and phased variant calls (ShapeIt4, 1000G reference). We then generated personalized diploid reference genomes for each individual to quantify allele-specific expression and splice site utilization.

We performed a standard cis-xQTL analysis to identify structural variants, short tandem repeats, indels and SNPs nominally associated with gene expression and/or splice site usage, including sex as an interaction variable. We used the SuSiE finemapping algorithm to identify variants most likely to be causally associated with sex-specific changes in expression or splicing. We performed gene ontology enrichment analyses to identify common functions underlying sex-differentially regulated genes.

Results:

Employing a pangenomic reference increased both average sequencing depth (31.5X -> 37.1X) and coverage (94.1% -> 99.4%), with notable improvement in African American donors (30.7X -> 37.8X). Personalized transcriptome alignments further yielded a 18.7 percentage point increase in proportion of reads aligned to genes (African Americans: 26.0 percentage point increase). These improvements reduce expression variability and increase the number of sex-by-genotype interactions discovered. We observed extensive evidence of allele specific expression in our dataset, including in ASD-associated genes. We identified 139 genes regulated by genetic variants in a sex-specific manner (purity >0.95). These differentially regulated genes are significantly associated with global developmental delay (p=3.12x10⁻³) and abnormal central motor function (p=9.14x10⁻⁴, 2.18x10⁻⁴), which are critical for neural progenitor proliferation and brain plasticity, respectively.

Conclusions:

Our work suggests that utilizing a pangenomic personalized transcriptome alignment strategy improves the detection of regions involved in gene regulation via QTLs. Additionally, we observe that genes important for neurodevelopment are differentially regulated in male and female DLPFCs during mid-gestation, providing a potential mechanism contributing to the sex-biased prevalence of some neurodevelopmental disorders.

ORAL SESSION — GENETICS

314 - The effect of CHD8 & Other Rare Variants on the Brain & Behavior in Mice & Humans

Moderator: Natasha Marrus, Washington University in St. Louis, St. Louis, MO

314.001 (Oral) Behavioral Features in Children and Adolescents with Rare Variants in ASD-Associated Genes: Phenotype & Developmental Insights


Background: Autism is associated with high rates of co-occurring mental health symptoms, yet we know little about psychiatric phenotypes of rare variants in high-confidence ASD genes. Understanding behavioral features of these variants can identify shared versus specific phenotypic features across gene groups, enable mechanistic understanding, and provide prognostic insights to inform clinical practice.
Objectives: We evaluate behavioral features within three gene groups associated with ASD – ADNP, CHD8, and DYRK1A – with two aims: (1) Characterize phenotype across behavioral domains of anxiety, depression, ADHD, and challenging behavior. (2) Understand whether early developmental milestones provide prognostic information.

Methods: Families with rare pathogenic variants in ADNP (n=21), CHD8 (n=19), or DYRK1A (n=25) completed extensive clinical phenotyping through in-person, in-home, and/or virtual methods, yielding data for 65 children and adolescents (27 female; mean age=8.84 years, range 3.9 to 18.7 years) with ongoing enrollment. Groups did not differ on verbal or nonverbal IQ, based on a subset with available IQ data (verbal IQ, \(F(2,44)=8.88, p=.002\); nonverbal IQ, \(F(2,45)=1.17, p=.32\)). Behavioral features were assessed through caregiver report with the Child Behavior Checklist (Achenbach, 1991), yielding age- and sex-normed T-scores for anxiety, affective (depression), attention/hyperactivity, and oppositional symptoms. Developmental milestones related to motor skills and language acquisition, as well as developmental regression (loss of motor, communication, or social skills), were assessed through structured caregiver interview (Autism Diagnostic Interview, Revised; Lord, Rutter, & Le Couteur, 1994).

Results: Patterns of behavioral features differed across gene groups (\(F(6,186)=4.1, p<.001\)), such that internalizing symptoms were most prominent for the CHD8 group (\(F(3,54)=12.2, p<.001\)). In contrast, ADNP was associated with elevated oppositional behavior relative to the other groups (\(F(2,62)=6.61, p=.003\)). These features were less prominent in DYRK1A, for whom attentional concerns were most common (\(F(3,72)=8.1, p<.001\)). In many cases, effects included both continuous symptoms measures, as well as likelihood of clinically significant elevations. With regard to developmental factors, correlations indicated that elevations in anxiety became more marked with increasing age, particularly for the ADNP (\(r=.63, p=.002\)) and CHD8 (\(r=.50, p=.029\)) groups. The predictive value of developmental milestones differed across gene groups, with delays in the acquisition of single words corresponding to fewer oppositional behavior in ADNP (\(F(2,56)=3.05, p=.05\)). Loss of developmental skills was more broadly relevant but differed in effect across the groups, such that skill loss was associated with less anxiety and oppositional behavior for those in the ADNP group, but more difficulties for those in the DYRK1A and CHD8 groups (anxiety, \(F(5,57)=3.4, p=.009\); oppositional, \(F(5,57)=4.3, p=.002\)). See Figure 1.

Conclusions: Findings suggest meaningful differentiation between groups with rare variants in these three high-confidence ASD genes, with anxiety and oppositional behavior as frequent areas of divergence between the groups. Anxiety may become particularly problematic for youth in these groups as they age. Developmental milestones related to language development may carry prognostic value as well, and loss of attained skills may be especially informative for later psychopathology. These findings may inform mechanistic models of gene effects moving forward, and carry implications for clinical screening and supports for affected youth and families.

314.002 (Oral) Delineation of Functionally Important Protein Domains of CHD8 for Assessment of Variants Linked to ASD


Background: Autism spectrum disorder (ASD) is an early-onset etiologically complex disorder with a broad clinical presentation. While a wide range of genetic and environmental factors are known to contribute to ASD, subsets of individuals carrying deleterious variations in the same gene exhibit common co-morbidities in addition to an ASD diagnosis. One such gene is CHD8, a high confidence ASD gene based on the identification and statistical enrichment of de novo likely gene-disruptive variants in individuals with a primary diagnosis of ASD. CHD8 has since been shown to be responsible for an associated neurodevelopmental syndrome in which affected individuals frequently present not only with ASD, but also intellectual disability, overgrowth, sleep disturbances, gastrointestinal problems, and dysmorphic features. However, it remains unclear what, if any, correlation there may be between the type and location of genetic variation affecting CHD8 and any specific phenotype known to be associated with mutations in this gene.

Objectives: We sought to further delineate the genetic and phenotypic characteristics of CHD8-associated syndrome by utilizing the richly detailed genetic data curated in the Human Gene module of AutDB, our online genetic database (http://autism.mindspec.org/autdb/Welcome.do), in an attempt to identify functionally important protein domains by using a large set of CHD8 variants associated with ASD and/or other neurodevelopmental disorders (NDD).

Methods: Rare genetic variations in CHD8 identified in individuals diagnosed with ASD or NDD were extracted from peer-reviewed scientific literature and annotated for inclusion in AutDB. The standardized variants were mapped to the canonical transcript as well as on the protein domain architecture of CHD8. A comprehensive set of variants distributed across CHD8 were used for the subsequent analysis. Randomization across protein domains was performed on the standardized CHD8 rare variant dataset, as well as on a dataset of CHD8 variants from gnomAD, to identify protein domains statistically enriched for variations linked to ASD. Additionally, detailed phenotypic information for individuals with CHD8 variations were extracted and standardized using Human Phenotype Ontology (HPO).

Results: A total of 204 individuals with rare variants in CHD8, 144 of whom were reported to have a diagnosis of ASD, were included for analysis. While disease-associated variants were distributed across the entire length of the CHD8 protein, randomization analysis demonstrated that the helicase ATP-binding domain displayed a statistically significant enrichment for ASD-associated variants, while a trend towards significance was observed for ASD-associated variants in both the chromo 2 domain and the helicase C-terminal domain of the protein. In contrast, neither NDD patients or controls from gnomAD showed a comparable enrichment for CHD8 variants in any protein domain in our analysis. The phenotypic profile of ASD individuals with variants in protein domains identified by randomization analysis
with at least a trend towards significance exhibit subtle differences in the frequencies of recurrent phenotypes observed in CHD8-associated syndrome, suggesting that variant location may influence phenotype.

Conclusions: Our approach of protein domain-based enrichment of variants associated with ASD improves understanding of functional consequences of CHD8 variations. Importantly, protein-domain map will facilitate interpretation of new CHD8 variants reported in large-scale genetic studies.

314.003  (Oral) Chd8 Haploinsufficient Mice Exhibit Reduced Novelty Induced Hyperactivity and Decreased Exploratory Behavior
D. Rivas, S. Dhanani, M. Begum, Y. K. Kim and R. A. Muhle, (1)Psychiatry, Columbia University, New York, NY, (2)Barnard University, New York, NY

Background:
Autism Spectrum Disorder (ASD) is characterized by repetitive behaviors, restricted interests, and altered social communication. Advances in sequencing technologies have established the association between mutations in specific genes and regions with an increased likelihood of ASD. Mutations in the gene Chromodomain Helicase DNA Binding Protein 8 (CHD8) are frequently associated with an ASD diagnosis, and understanding how loss of CHD8 impacts neurodevelopmental pathways across the lifespan holds the potential for improved clinical care. By using mouse models that recapitulate the genetic changes in CHD8 found in patients, we can implicate certain brain regions and neurochemical pathways for further study by using behavioral assays tied to these brain circuits. We are using Chd8+/− haploinsufficient mice to assess the effect of CHD8 loss on social, emotion regulation, locomotor, and repetitive behaviors.

Objectives:
This study assessed the effects of Chd8 gene disruption on anxiety-like, repetitive, and social behaviors using a mouse model of CHD8 haploinsufficiency. These behavioral readouts provide insight into brain regions and functional circuits affected by CHD8 loss, Chd8+/−.

Methods:
Behavioral assessments were performed with 40 mice (20 wildtype, 20 Chd8+/−, with equal sex distribution and similar age). The order of assays was: open field, marble burying, nestlet shredding, Y-maze spontaneous alternation, self-grooming & spray test, 3-chamber socialization, rotarod. Data was analyzed using 2-way repeated measures ANOVA (including sex and genotype as variables) unless noted. Average values per group are presented.

Results:
In the open field, Chd8+/− mice travelled significantly less distance (5419cm vs 4376cm, p <0.0001), and spent less time in the center of the arena (1007sec vs 714.2sec, p <0.0001). All mice showed novelty-induced hyperactivity in the first 10 minutes, but Chd8+/− mice showed a significant decrease in rearing throughout the assay (489.8 rears vs 264.1 rears, p <0.0001). We found no difference in the latency to fall from an accelerating rotarod. In tests of repetitive and stereotyped behavior (marble burying, nestlet shredding, self-grooming & spray tests) we found no difference between genotype or sex. In the Y-maze test, we found no difference in the proportion of arms entered (percent alternation) but found a significant decrease in the number of arm entries in Chd8−− females (65.3 v 42.6 avg. entries, p <0.0001 by unpaired, 2-tailed t-test). In the 3-chamber assay for social preference, we found no difference by genotype in the preference for stranger mice over objects, and no preference for a novel mouse over the first mouse.

Conclusions:
Chd8+/− mice show increased anxiety-like behaviors as shown by reduced novelty-induced hyperactivity, reduced rearing, and reduced time in the center of the open field. This did not differ by sex, but there was a deficit in number of arm entries in the Y-maze in females but not males. Chd8−− mice exhibit novelty induced hyperactivity, but to a lesser degree than wildtype mice, suggesting a motor pathway deficit. We found no difference in latency to fall from a rotarod, suggesting no underlying motor deficit is responsible for the reduced movement of Chd8−− mice, and implicating higher order brain structures.

314.004  (Oral) Cell-Type and Region-Specific Impacts of Chd8 Haploinsufficiency in Mouse Brain
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Background: CHD8 is among the top causal genes to be identified via ASD case sequencing studies, yet little remains known about the cellular and molecular mechanisms linking CHD8 haploinsufficiency and neurodevelopmental disorders. Similarly, comparative studies of the effects of CHD8 haploinsufficiency across brain regions are lacking.

Objectives: We sought to identify the transcriptional changes across cortical cell types and between cortex, hippocampus, and cerebellum in heterozygous constitutive germline Chd8 mutant mice. The goal of this work is to evaluate brain regions, cells, and biological pathways for a role in NDD pathology.

Methods: We generated bulk RNA-seq data from adult brain regions and analyzed for differential gene expression and network level signatures with WGCNA. We generated single nuclei RNA-seq prepared from age-matched adult cerebral cortex and tested for altered cell populations and cell-type specific gene expression changes.

Results: We identified both region-specific and shared differential gene expression signatures, with some differences between male and female Chd8 mutant mice. Major pathways effects includes upregulation of metabolic and energetic genes and downregulation of synaptic and neuronal gene sets. For single nuclei data, we mapped differentially expressed genes from bulk analysis to cell type and further identified cell-type specific signatures in neuronal and non-neuronal cell types. Validation and follow up analysis are ongoing.

Conclusions: Our results reveal diverse cellular and molecular phenotypes in the adult Chd8 heterozygous mutant mouse brain, with stronger effects identified in cortex and cerebellum. Both neuronal and non-neuronal cell populations exhibit altered gene expression, with stronger effects in specific sub-populations. Most changes in gene expression are subtle, both at the bulk and cell-type specific level, but implicate specific gene sets and pathways for further investigation.

POSTER SESSION — GENETICS

414 - Genetics

414.226 (Poster) A Systematic Review and Meta-Analysis of Research Using the Autism Polygenic Score


Background: Autism is a highly heritable, common neurodevelopmental diagnosis characterized by a very heterogeneous pattern of behaviors. It often co-occurs with other diagnoses. Recent genome-wide association studies (GWAS) revealed the polygenic nature of autism. Polygenic scores (PGS) are based on genetic effect estimates from these GWAS and reflects an individual’s inherited propensity towards autism. PGS are considered tools with great potential for research, which has resulted in an increasing number of studies that use the autism PGS to assess its relation with autism and other phenotypes.

Objectives: Here, we systematically reviewed and meta-analyzed all published associations between the autism PGS and autism diagnostic status, autistic traits, and other behavioral and neurobiological phenotypes that have been investigated.

Methods: We limited the literature search to PGS analyses that were based on the latest autism GWAS (Grove et al. 2019). All included studies underwent a thorough quality assessment. We grouped our outcome variables into meaningful categories.

Results: In total, 58 studies met our inclusion criteria and these examined a wide range of outcome variables. Eligible studies were published between 2019 and 2022. The vast majority of the included studies was of good quality. Here, we describe the systematic review and meta-analysis results of four of the twelve categories of outcome variables.

Autism Diagnosis and traits

In sum, for the association of the autism PGS with autism diagnosis, two out of three studies reported a significant association. For autistic traits, two studies reported a statistically significant association, two studies observed no association, and three reported mixed results depending on the scale used as the outcome measure. Meta-analysis showed a significant association between autism PGS and autism diagnosis ($r = .19$ [95% BI .08 - .30], $p < .01$) and autistic traits ($r = .04$ [95% BI .02 - .05], $p < .01$).

General psychopathology and specific psychiatric classifications
For general psychopathology ($p$ factor), only one of the four studies found an association between the autism PGS and general psychopathology. Seven studies reported mixed results between the autism PGS and specific psychiatric classifications (i.e. bipolar disorder and psychotic experiences), and four studies reported no association (i.e. cannabis use disorder, nocturnal enuresis). Meta-analysis showed a small significant association between autism PGS and specific psychiatric classifications ($r = .03 [95\% BI .01 -.04], p < .01$) but not with general psychopathology ($r = .02 [95\% BI .00 - .04], p < .01$).

Conclusions: In conclusion, the latest autism GWAS has stimulated a range of studies assessing the relation between autism PGS and a myriad of outcome variables. So far, results of associations with autism diagnosis and traits, co-occurring psychiatric classifications and general psychopathology are mixed. Meta-analysis revealed a significant association between autism PGS and autism diagnosis, autistic traits and other specific psychiatric classifications, but the effect sizes were generally small. We will discuss the results of our full systematic review and meta-analyses and potential explanations of our findings.

### 414.227 (Poster) An Association Study of Aberrant Brain Morphology-Naip Copy Number Variation with Social Deficits in Autism Spectrum Disorder

**C. H. Tsai**, Y. C. Chen and S. S. F. Gau, (1)National Taiwan University, Taipei, Taiwan, (2)Department of Psychiatry, National Taiwan University Hospital & College of Medicine, Taipei, Taiwan

**Background:** Autism spectrum disorder (ASD) describes an umbrella of early-onset neurodevelopmental conditions characterized by persistent deficits in social communication and reciprocal interaction and repetitive and stereotyped behaviors and interests. Given that this prevalent highly heritable disorder possesses heterogeneous characteristics in both clinical and genetic aspects, recent studies have proposed that the genetic variations may contribute to the neural developmental processing of ASD and individual differences. Moreover, evidence supported that the genes involved in apoptotic mechanisms may also partially contribute to ASD traits. *NAIP*, NLR family apoptosis inhibitory gene, encodes an anti-apoptotic protein. *NAIP* is expressed throughout brain regions. Alterations of *NAIP* may be associated with alteration of the size and shape of the brain and dysregulation of the proper wiring of the neuronal network. Therefore, we hypothesized that both deletion and duplication of *NAIP* were associated with atypical brain volume and affected the social behaviors of ASD. However, little is known about how apoptosis-related gene variations participate in the pathogenesis of ASD.

**Objectives:** Herein, we aim to investigate the underlying associations among apoptosis-related ASD susceptibility gene variations, brain volume, and behavioral problems.

**Methods:** Experimental data were collected from ASD patients (n = 40, ASD), their unaffected siblings (n = 40, SIB), and typically developing controls (n = 54, TDC) of the Taiwanese Han population. Along with clinical measures of the Social Responsiveness Scale (SRS) and Child Behavior Checklist (CBCL), all participants also received exome sequencing targeted at the 525 ASD susceptibility genes reported by Autism Gene Database (AutDB). Targeted exome gene sequencing procedures were performed with 100M reads per sample on the Illumina Miseq system. Data analyses were implemented on the Galaxy platform. Further, we acquired T1(MPRAGE; 3T Siemens trio) images from all subjects, and Freesurfer (Version 6.0) was used for our imaging preprocessing. All brain regions were derived from parcellations based on Desikan-Killiany-Tourville (DKT) atlas. We used linear regression models controlling for sex and age to examine the associations among *NAIP* CNV via reads ratio, the extent to which the copy number deviates from the non-carriers, brain volume, and clinical measures, with the significance level at p-value <0.05.

**Results:** Greater volume in the superior temporal sulcus, anterior occipital sulcus, and posterior limit of the orbitofrontal cortex, which was correlated with the higher reads ratio of *NAIP*, was found in ASD than SIB and TDC. Further, there was a positive correlation of *NAIP* CNV with the social emotion subscale and total score of SRS. In addition, there were positive correlations between *NAIP* CNV and both anxiety-depression and social problems subscales on the CBCL. Overall, we found positive associations among the brain volume, *NAIP* CNV, and clinical symptoms (social and behavioral deficits) only in the ASD group. However, none of these findings was observed in SIB or TDC.

**Conclusions:** Our findings of *NAIP* CNVs-brain structure-behaviors relationships support the concept that apoptosis-related genes may contribute to the brain morphology and behavioral deficits of ASD.

### 414.228 (Poster) Assessment of Gene-Environment Interactions in ASD through Four-Generation Artificial Neural Network: A Pilot Study

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**Background:**
Autism spectrum disorder (ASD) is a genetically heterogeneous disorder and may be caused by both inherited and de novo gene variants. Increasing evidence points to a contribution of environmental and epigenetic factors in ASD, but their connections are still largely unexplored.

Objectives:

Aim of the present pilot study was to apply the Auto Contractive Map algorithm (Auto CM), a special kind of Artificial Neural Networks to link various ASD maternal risk factors to the DNA methylation levels of selected genes, sex, and symptoms severity (ADOS 2 score) of their children diagnosed with an ASD.

Methods:

A total of 58 ASD children aged less than 8 years (mean age 4.35 ± 1.79 years) were recruited, including 23 males and 35 females. Blood DNA methylation levels of MECP 2, BDNF, OXTR, RELN, BCL 2, EN 2, and HTR 1 A, were measured by means of MS HRM technique. Mothers filled in a detailed questionnaire on various environmental factors during pregnancy. We also investigated the methylation levels of miRNA encoding genes (miR-30e, miR-23/27a, miR 28 miR 92 a 1 miR 92 a 2 miR 21) in DNA extracted from saliva of 11 idiopathic ASD and 13 typically developing preschool aged girls. To graphically show the most important connections among variables we used a four generation artificial neural network called Auto-CM, that develops weights that are proportional to the strength of the associations of all variables each other. The weights are then transformed in physical distances so that couples of variables whose connection weights are higher become nearer and vice versa. After the training phase, the weights matrix of the Auto-CM represents the warped landscape of the dataset. Subsequently, a minimum spanning tree filter was applied to the weights matrix of the Auto-CM system to obtain a map of the main connections between the variables of the dataset and the basic semantic of their similarities, defined connectivity map (figure 1).

Results:

Sex differences were observed in blood DNA methylation levels of the studied genes, and ANNs revealed sex-specific connections among maternal risk factors and gene methylation. Furthermore, ANNs selected a set of variables allowing discriminating between high and low-moderate ADOS-2 scores with 86.8% overall accuracy. Particularly, high gestational weight gain, lack of folic acid supplements, advanced maternal age, pre-term birth, low birthweight, and living in rural context were the best predictors of high ADOS-2 score. Moreover, the analysis of saliva DNA samples revealed that Mir-28 methylation levels could represent a biomarker of disease severity in ASD children.

Conclusions:

ANNs revealed links among ASD maternal risk factors, symptoms severity and gene methylation levels, as well as sex differences in gene methylation levels that warrant further investigation in ASD.

414.229 (Poster) Autscore – an Integrative Scoring Approach for Prioritization of Ultra-Rare Candidate ASD Genetic Variants from Whole Exome Sequencing Data

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Background:

Identification of susceptibility genetic variants of autism spectrum disorder (ASD) in whole-exome sequencing (WES) data is a complex task. Existing bioinformatics tools to identify clinically relevant genetic variants in WES data are not specific to ASD. Thus, there is a need for automatic in-silico tools to facilitate the detection of ASD susceptibility variants in WES data.

Objectives:
We developed ‘AutScore’, an integrative scoring approach to prioritize ultra-rare candidate ASD genetic variants from whole exome sequencing data and assessed its performance to identify clinically relevant genetic variants of ASD.

Methods:

AutScore was applied to a joint variant calling format (vcf) file of 219 ASD probands and their parents registered at the database of the Azrieli National Center for Autism and Neurodevelopment Research. First, rare (allele frequency <1%) and poor-quality variants were removed from the data. Then, we used the pedigree structure of the families to select only proband-specific genotypes (i.e., de-novo, sex-linked, and recessive). Finally, we used a range of in-silico tools to prioritize the remaining variants according to their pathogenicity, clinical relevance, gene-disease association, and inheritance pattern. Variants in the upper quartile of AutScore were evaluated by clinical experts that visually inspected them with the IGV tool to detect potential false-positive variants and rated them on a 1-5 scale according to their clinical relevance to the affected probands.

Results:

Overall, 275 ultra-rare variants distributed in 226 genes in 142 probands were evaluated by AutScore and their scores ranged from -4 to 21 with a median=4 and IQR=6 (Figure 1). A total of 15 of the 60 top-rated variants (25%) were suspected as false positives and were removed from further analysis. Of the remaining variants, 26 (in 24 probands) were ranked by the clinical experts to be “highly relevant” or “relevant” to ASD, resulting in a detection yield of 11%. Of these, 18 variants (69.2%) were found in 17 genes ranked by the SFARI database as high-confidence ASD genes (Score 1) and another 3 variants (11.5%) in 3 lower-ranked SFARI genes (Scores 2 or 3). Interestingly, five variants with AutScores ranging from 11 to 14, were detected in five ASD novel genes. Comparing AutScore and the clinical expert rankings revealed that AutScore cutoffs of ≥ 11 or ≥ 12 had the best performance in detecting ASD susceptibility variants with a detection accuracy of 93.4% and 93.8% and a detection yield of 11% and 10.5% respectively (Figure 2).

Conclusions:

AutScore is an efficient automatic tool for prioritizing candidate ASD genetic variants in WES data. Important extensions of this tool should include analyses of copy-number variants, compound heterozygote variants, and partially penetrant variants.

414.230 (Poster) Concentration of Placenta Folate Metabolites in a High-Risk Autism Cohort Is Associated with DNA Methylation in Genomic Regions Involved in Neurodevelopment.

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Background: While the etiology of autism spectrum disorder (ASD) is partially genetic, numerous environmental exposures have been associated with ASD risk. Prior studies have highlighted prenatal folic acid levels as one such potential ASD-associated environmental exposure, with disruptions to folate metabolism potentially inducing downstream epigenetic dysregulation as detected by DNA methylation. Nonetheless, few studies have attempted to directly identify associations between folate metabolite levels and placental DNA methylation genome-wide. Identifying signatures of DNA methylation associated with ASD-implicated environmental exposures may help illuminate the mechanisms by which folate metabolism converges with ASD development.

Objectives: By identifying differential methylation patterns associated with both placental folate metabolite levels and placenta DNA methylation in a high-risk ASD cohort, this study aimed to highlight the gene networks associated with folate metabolites in order to gain insights into folate's protective role in the molecular etiology of ASD.

Methods: Whole genome bisulfite sequencing (WGBS) was performed on DNA from 95 placentas from the MARBLES high-risk prospective ASD cohort. Concentrations of folate metabolites tetrahydrofolic acid (THF), 5-formyl-tetrahydrofolate (5-Fo-THF), 5-methyl-tetrahydrofolate (5-Me-THF), and folic acid (FA) from those same placentas were measured using a LC-MS/MS. WGBS data from the placenta samples were then used to generate comethylation networks via the Comethyl R package. The associations between comethylation modules and various sample traits, including placenta folate metabolite levels and child ASD diagnoses, were then tested, with comethylation modules showing significant associations with either trait annotated to investigate genomic membership.

Results: None of the comethylation modules found to be significantly associated with maternal use of folate-containing vitamin supplements were also associated with measured placenta folate-related metabolite levels. No significant associations were identified between placenta 5-Me-THF and placenta THF levels. Placenta 5-Fo-THF and placenta FA levels each were associated with one comethylation module (salmon and yellow modules, respectively). Hypermethylation of the salmon comethylation module was associated with increased placenta 5-Fo-THF levels, and salmon module hypomethylation was associated with increased ADOS score and increased...
likelihood of ASD diagnosis. Upon annotation, the salmon module was observed to contain the genes \textit{PLCB1} and \textit{PLCB4}, both of which are implicated in reproduction and immune pathways. Hypomethylation of the yellow comethylation module was associated with increased placenta FA levels and with higher child Mullens Scores. The yellow module contained \textit{AUTS2}, a protein-coding gene involved in neurodevelopment and implicated in multiple neurological disorders, including ASD.

Conclusions: This study identified two comethylated gene networks associated with placental folate metabolite concentrations and neurodevelopmental outcomes. Further investigation will be required to determine whether placenta folate metabolites are directly altering placenta DNA methylation in gene pathways relevant to neurodevelopmental outcomes.

414.231 (Poster) De Novo Mutations in DLL1 Gene Revealed b By Whole-Exome Sequencing in Three Libyan Siblings with Autism Spectrum Disorder
A. M. Zeglam, Pediatric Neurology, Faculty of Medicine, Tripoli University, Tripoli, Libya

Background: Autism spectrum disorder (ASD) is a clinically heterogeneous neurodevelopmental disorder with various genetic backgrounds characterized by impaired social interaction and communication, and stereotyped behaviors and interests. It is a highly prevalent disorder. According to CDC, one in 58 children are identified as having ASD. Presently, a number of genetic syndromes are known to be related to ASD.

Objectives: Here, we report a novel mutation in DELL1 gene revealed by whole-exome sequencing (WES) in three Libyan siblings (brother and two sisters) with ASD and intellectual disability. The father of the children signed the informed consent form.

Methods: Whole exome sequencing was performed in an accredited commercial laboratory (BIOSCIENTIA International-Germany). WES identified the heterozygous variant c.362_365del p. (Ser121*) in DLL1 (OMIM:606582) which leads to a frameshift, resulting in a premature stop codon, and subsequent mRNA degradation (nonsense-mediated decay) or truncation of the protein. Parallel analysis of the WES data also found the same DLL1 variant in the affected sister and brother of the index.

Results: To the best of our knowledge the variant has not been described in the literature so far (HGMD 2020.1); although several other loss of function variants in DLL1 have been reported in similarly affected patients (PMID:31353024). Allele frequency of this variant in the general population has not been documented.

Conclusions: The DLL1 gene encodes a Notch ligand. Notch signaling is essential for appropriate cell differentiation and cell fate decisions, and plays a role in developmental, homeostatic, and disease processes. DLL1 is a human homolog of the Drosophila Notch ligand Delta, and plays an important role in the developing nervous system and somites.

Pathogenic variant in DLL1 cause autosomal dominant neurodevelopmental disorder with nonspecific brain abnormalities and with or without seizures (NEDBAS; OMIM:618709).

Therefore, its loss-of-function or pathogenic missense mutations are likely to be responsible for the clinical features of the children and needs further studies and deserves consideration when dealing with families who have more than one child with ASD.

<table>
<thead>
<tr>
<th>Classification</th>
<th>MAF gnomAD [%]</th>
<th>Zygosity</th>
<th>Variant</th>
<th>Phenotype MIM number</th>
<th>Gene (Isoform)</th>
<th>Mode of Inheritance</th>
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<td>Likely</td>
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<td>chr6:170597863</td>
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Key words: Autism, Libya, DLL1 gene, Neurodevelopment

414.232 (Poster) De Novo Variants in Three-Generation ASD Families
Background: Autism Spectrum Disorder (ASD) risk has been positively correlated with advanced paternal age, which partially explains the high proportion of de novo variants (DNVs) in ASD probands. DNVs analysis has also proven to be a powerful approach to gene discovery in ASD, which has not yet been shown in a Brazilian ASD cohort.

Objectives: We hypothesized that three-generation analyses of DNVs could provide new insights into the relevance of variants that have arisen de novo across generations.

Methods: To accomplish this goal, we performed whole-exome sequencing of 33 septets families composed of probands, parents, and grandparents (n = 231 individuals), and compared these DNV rates (DNVr) with those from two control cohorts.

Results: The DNVr in the probands (DNVr = 1.22) was higher than in parents (DNVr = 0.62; p=0.04), and in controls (DNVr = 0.68; p=0.02, congenital heart disorder and DNVr = 0.70; p=0.02, unaffected ASD siblings). Moreover, for the DNVs whose origin could be assessed, the vast majority were found to have paternal origin in both generations (84.6%). Finally, we observed that 43% (6/14) of the DNVs in parents transmitted for probands are in ASD or ASD candidate genes, representing recently emerged risk variants to ASD in their families and suggest ZNF536, MSL2 and HDAC9, as ASD candidate genes.

Conclusions: In conclusion, our study showed that the analysis of three-generations presents a promising strategy to investigate the effect of de novo and inherited risk variants in ASD, with a better cost-effective effect than extreme large population studies.
To conclude, the identified results may bear important new insights into altered oxytocinergic signaling in ASD, which may aid in establishing relevant biomarkers for diagnostic and/or treatment evaluation purposes, as well as for the development of new treatment approaches for targeting the oxytocinergic system in ASD.

414.234 (Poster) Examining Symptoms of Autism Spectrum Disorder and Behavioral Phenotypes in Young Children with CLN2 Disease

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Background: CLN2 disease (neuronal ceroid lipofuscinosis type 2) is caused by a deficiency in the enzyme, tripeptidyl peptidase 1 (TPP1) and is a rare, fatal, neurodegenerative lysosomal storage disease (Mole et al., 2020). CLN2 disease is an autosomal recessive disorder and symptoms emerge early, usually by 3 years of age, and progress rapidly with seizure onset and the loss of motor and vision functioning (Williams et al., 2017). Children with CLN2 disease may also have behavioral challenges and 80% present early language delays (Nickel et al., 2018), which are also characteristic symptoms of Autism Spectrum Disorder (ASD; American Psychiatric Association, 2013). Little research has examined ASD symptomology in younger children with CLN2 disease. It is important to identify behavioral phenotypes associated with CLN2 disease to inform diagnostic and treatment practices.

Objectives: The present study aims to examine symptoms of ASD, behavioral, and developmental profiles in children with CLN2 disease with and without a clinical diagnosis of ASD.

Methods: Data was collected as part of an ongoing, longitudinal, clinical study. Participants in the current study included 20 children (12 females) between the ages of 1-5 years with a diagnosis of CLN2 disease. This sample was characterized to include children with CLN2 disease that received a clinical diagnosis of ASD (N = 6; 30%) and children without a diagnosis of ASD (N = 14; 70%). Symptoms of ASD and behavioral functioning were assessed using T-scores from scales on the Child Behavior Checklist (CBCL) via caregiver report. Developmental functioning was measured by raw scores and age equivalencies on the Mullen Scales of Early Learning (MSEL) across visual reception, fine motor, receptive language, and expressive language scales.

Results: Statistically significant group differences across T-scores are present on CBCL scales assessing attention (t (18) = 3.7, p <.01), aggressive behavior (t (18) = 2.9, p <.01), externalizing problems (t (18) = 3.3, p <.01), total problems (t (18) = 2.4, p <.05), as well as CBCL DSM-5 scales assessing ADHD problems (t (18) = 4.4, p < .01), and anxiety problems (t (18) = 2.2, p <.05). Children with CLN2 disease and ASD were reported to demonstrate more problems in comparison to children with CLN2 disease without ASD. There were no statistically significant differences (p >.05) on measures of chronological age across groups. There were no differences on measures of developmental functioning across scales on the MSEL.

Conclusions: Results suggest that young children with CLN2 disease may be at higher risk for ASD and children with CLN2 disease and ASD have increased behavioral challenges such aggression, externalizing problems, anxiety, and symptoms of ADHD. Limitations of the present study include a small sample size, cross-sectional study, and lack of ASD-specific measures. Future research should further evaluate how behavioral symptoms present and change over time in children with CLN2 disease to inform diagnostic decisions and treatment efforts. Behavioral intervention, such as Applied Behavioral Analysis (ABA), may help improve quality of life by addressing behavioral challenges and teaching functional communication.

414.235 (Poster) FMR1 Cgg Repeat Length Interacts with Adverse Childhood Experiences to Influence Expression of the Broad Autism Phenotype

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Background: The FMR1 gene plays a major role in genetic susceptibility to autism, with one-third to one-half of autism susceptibility genes regulated by FMR1 protein (Darnell et al., 2011). The length of the FMR1 trinucleotide CGG sequence varies in the normal population, with 6-45 considered “normal” but with ~30 repeats reflecting the population mode. New research has linked lower-than-typical numbers of CGG repeats with a variety of adverse phenotypes, including reduced well-being, motor, and cognitive function (Klusek et al., 2022; Mailick et al. 2014). Yet, despite strong evidence that FMR1 contributes to autism susceptibility, there has been little research into how variation in FMR1 CGG length may relate to the expression of autism or broader autism phenotype (BAP) traits in the population.

Objectives: In this study we investigated the relationship between CGG length and the expression of BAP traits in healthy adult women. We focused on women because they are more likely than men to carry lower-than-typical CGG repeat lengths (Kraan et al., 2018). Consistent with emerging evidence of FMR1 gene-environment interactions (Mailick et al., 2020, we also tested interactions with adverse childhood experiences (ACEs), a major environmental stressor associated with increased psychiatric risk.
Methods: Participants were 82 women who had no immediate family history of autism and were biological mothers of typically developing children (M age=47; range 27-73). The women completed the Broad Autism Phenotype Questionnaire (BAPQ; Hurley et al., 2007), a well-validated self-report questionnaire that measures the expression of BAP traits, and the ACE questionnaire (Felitti et al., 1998), which inquires about the presence of 10 types of childhood traumas (e.g., abuse, neglect) and yields a total score reflecting childhood adversity. Buccal swabs were collected and CGG repeat analysis conducted using the Asuragen® assay. General linear models tested CGG length on the shorter allele, ACE score, and their interaction, as predictors of the BAPQ scores, while controlling for the CGG repeat length on the other allele. Age and education were tested as covariates but were not retained (p’s>.253).

Results: Consistent with a gene-environment interaction, the interaction between ACES and CGG length accounted for significant variance in overall expression of BAP traits (p=.035, η²=.057). High ACES were associated with increased expression of BAP traits only among women who also carried lower-than-typical CGG lengths. Similar gene-by-environment interactions were observed for the models predicting the aloof (p=.012, η²=.08) and rigid (p=.036, η²=.06) subscales of the BAPQ, but not for pragmatics (p=.988, η²<.01).

Conclusions: Lower-than-typical numbers of FMR1 CGG repeats increased vulnerability to the BAP among women who had also experienced significant environmental stressors in the form of ACES. Thus, findings suggest that variation in FMR1 CGG repeats contributes to BAP expression in the population, with environmental stress exposure moderating this relationship. Follow-up in a larger epidemiological sample, including men, or in those with elevated autism risk, will better inform relationships. One-third of women and one-fifth of men in the US carry lower-than-typical numbers of CGG repeats (e.g., the “low zone” FMR1 genotype), highlighting broad implications for population health.

414.236 (Poster) Forebrain Organoids Model the Impact of Autism-Associated De Novo Mutations in TBR1

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Background:

The in vitro differentiation of forebrain-like organoids from induced pluripotent stem cells (iPSCs) has been shown to recapitulate many early neurodevelopmental processes in vivo. This time period is critical for many autism risk genes, especially in deep layer neurons. Recent work from our lab has identified changes in cortical layer formation of patient-specific Thr1 mutant mice, particularly K228E homozygotes (Co et al., 2022). Exploring if these differences can be recapitulated in patient-derived organoids is an essential step in validating these results in human cells.

Objectives:

Here, we perform an intensive genomic characterization of these forebrain organoid models using immunohistochemistry and single-cell genomics to better understand the effects of de novo mutations (DNMs) in TBR1, a key transcriptional regulator of deep layer neuronal fate. We then compare changes in expression and layer morphology of K228E mouse and human models to identify commonalities and validate these as in vivo and in vitro models of autism.

Methods:

Using CRISPR-Cas9, isogenic pairs of a control iPSC line were edited to contain DNMs in TBR1. Forebrain-like organoids were generated over 90 days in vitro (Qian et al., 2018). IHC was utilized to characterize the cell-types and quality of each differentiation. Dynamic changes in epigenetic state during organoid differentiation were assessed using single-cell combinatorial indexing (sci) ATAC-seq (Mulqueen et al., 2019). Single-cell profiles were collapsed into groups using cisTopic then analyzed for enrichment of specific transcription factor binding motifs. Pseudotemporal analysis was performed to uncover the succession of putative transcription factor activity.

Results:

To ensure reproducibility and test epigenome correlation to primary samples of neurodevelopment, we performed IHC and single-cell ATAC-seq on a control iPSC line. From the sci-ATAC assays, we generated 31,280 cells with 183,391 open regions of chromatin passing quality control from 16 organoids and two independent differentiations. Across differentiation time points, we observed clear shifts in cell-type populations and epigenomic reconfiguration consistent with waves of transcriptional regulatory activity controlling differentiation and neurogenesis. New primary fetal tissue data sets revealed correlating chromatin signatures of cell cycle stages and improved our differentiation trajectory through chromatin dynamics of differentiation.
Additionally, we are currently generating organoids from isogenic pairs with or without the TBR1-K228E mutation. Data from these models will be used to validate the expression and cortical layer abnormalities noted in mice with an analogous mutation, including TBR1 upregulation and layering defects. This will involve the same organoid differentiation and characterization process, which will be analyzed prior to the meeting.

Conclusions:

In vitro modeling allows us to study the impact of specific DNMs on early human brain development. Our control line data demonstrates these models recapitulated the transcriptional waves of activity that control cell-fate during corticogenesis. Our current experiments are poised to inform the translational efficacy of in vivo cortical layer aberrations in K228E mice using human cells in 3D culture. Ultimately, we believe this system will be a powerful model for discovering the molecular and cellular impacts of autism-associated DNMs; specifically, in transcriptional regulators like TBR1.

414.237 (Poster) Functional Analysis of Genetic Variations Found in Clinical Exomes of ASD/ID Patients
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Background: Autism Spectrum Disorder (ASD) is a clinically heterogeneous neurodevelopmental disorder diagnosed by restrictive, repetitive behaviors paired with persistent social communication deficits. ASD imposes a significant disease burden: every 1 in 100 children in the world is autistic (1 in 54 in the US). Median estimates suggest 33% of these children also have Intellectual Disability (ID), defined as moderate to severe cognitive impairment. ASD/ID have a complex genetic architecture. There are more than a hundred genes involved, with highly penetrant, rare loss of function (LoF) mutations implicated in the disease, but most of them are restricted to a small subset of patients. Clinical exome sequencing has contributed to the discovery of missense variants in known genes; however, there exists a wide gap in functionally annotating them to inform clinical decisions. Often variants in a known ASD/ID gene are classified as variants of uncertain significance (VUS).

Objectives: We sought to develop a framework to characterize VUS in Coiled-coil and C2 domain containing 1A (CC2D1A; MIM *610055, UniProtKB Q24K25), a gene leading to moderate to severe autosomal recessive ID with comorbid ASD in 40% of cases.

Methods: Variants were cloned and overexpressed either individually or in patient combination in HEK293 cells. Luciferase reporter assay was used to test their effect on CREB activation, a downstream effector of CC2D1A. Competitive ELISA was performed to measure cAMP levels. To test phosphodiesterase 4D5 (PDE4D5) interaction, cells were co-transfected with PDE4D5-Myc and HA-tagged mutant (or wild type, WT) CC2D1A, followed by immunoprecipitation with anti-Myc antibody and quantification of CC2D1A on a western blot.

Results: We report four cases (three males, one female) with compound heterozygous missense variants [c.980C>T(p.Ser327Leu)/c.1345G>A(p.Val449Met), c.980C>T(p.Ser327Leu)/c.1322G>T(p.Gly441Val), c.956C>T(p.Pro319Leu)/ c.2728G>A(p.Glu910Lys), c.1739C>T(p.Thr580Ile)/c.2675G>A,T(p.Arg886His)] (Table 1). Overexpression of each CC2D1A VUS neither affected protein stability nor the survival of the transfected cells. CC2D1A is a signaling scaffold which modulates protein kinase A (PKA)/CREB activity by repressing PDE4D. This interaction is likely mediated by its unique DM14 domains while its C2 domain tethers the signaling complex to the plasma membrane. We hypothesized that missense DM14 variants (S327L, G441V, V449M, P319L and T580I) disrupt binding and release PDE4D repression, increasing cAMP degradation and reducing CREB activation. We quantified CREB activation 24hrs after transfection, following a 6hrs forskolin treatment to activate this pathway. Compared to the WT, four DM14 variants G441V, V449M, P319L and T580I lead to blunted response to forskolin induced CREB activation (p=0.0313, N=6-7, Wilcoxon matched pairs signed rank test), suggesting these are most likely LoF (Figure 1). S327L, V449M, P319L, T580I and R886I also have a concomitant reduction in cAMP levels (p<0.05, N=6, Wilcoxon matched pairs signed rank test). We are currently testing the effect of each variant on PDE4D5 binding and our preliminary results show that a few DM14 mutants reduce CC2D1A binding.

Conclusions: Our data suggest DM14 mutations affect CC2D1A binding to PDE4D to disrupt PKA/CREB signaling. CREB activation and cAMP degradation assays can be used for functional validation of VUSs. Variants disrupting this pathway may be amenable to treatment with PDE4D inhibitors.

414.238 (Poster) Genetic Variations Associated with Ultrasonography Fetal Anomalies in Children with Autism Spectrum Disorder
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Background:

Recently, we reported that ultrasonography fetal anomalies (UFAs) during mid-gestation are detected in ~30% of fetuses later diagnosed with autism spectrum disorder. Given the significant genetic contribution to both ASD and prenatal UFAs we hypothesized that shared genetic mechanisms underlie the comorbidity of ASD and UFAs.

Objectives:

To identify genetic mutations associated with UFAs in children with ASD.

Methods:

We conducted a cross-sectional study of all children diagnosed with ASD registered at the Azrieli National Centre for Autism and Neurodevelopment (ANCAN) who have both fetal ultrasound and WES data. We used an integrative in-house bioinformatics pipeline specifically designated to identify gene-disrupting variants (GDVs) in a panel of >1200 genes associated with ASD according to SFARI gene database. We compared the prevalence of identified GDVs between children with and without UFAs.

Results:

UFAs were found in 49 of the 115 (42.6%) children who had both prenatal ultrasound and WES data at the ANCAN database. Children with and without UFAs did not differ in their sociodemographic and clinical characteristics except for a significantly higher proportion of females in the UFA group (36.6% vs. 15.2%, respectively; p=0.011). Notably, children with UFAs were more likely to have GDVs in ASD genes than their counterparts even after adjustment to the sex differences between the groups (aOR=2.27, 95%CI: 1.05-4.93), and this association was the most prominent with GDVs in high-confidence ASD genes (i.e., those with SFARI gene score=1). Similarly, GDVs in ASD genes were significantly associated with specific fetal anomalies (Figure 1) with abnormal fetal size (either small/large for gestational age) and UFAs in the head&brain being the most prominent ones (OR=10.44 95% CI=1.26-86.42, and OR=3.87 95% CI=0.99-15.12 respectively). Finally, a moderate but significant correlation was found between the numbers of GDVs and UFAs found in the study sample (r=0.20, p=0.035).

Conclusions:

Our findings suggest distinct genetic mechanisms of UFAs predisposing ASD diagnosis. These findings may form a basis for future prenatal screening approaches for ASD using both ultrasound and genetic testing.

Background: We have established the Genomics of Autism in Latinx Ancestries (GALA) Consortium to develop a large prospective cohort to examine the role of genetic and environmental factors in autism across ancestral backgrounds and collect, genotype and sequence genetic materials for large-scale analyses. This abstract is presented on behalf of the GALA Consortium and the Autism Sequencing Consortium (ASC).

Objectives: Despite the success of large-scale genetic analyses for autism, the question of whether its genetic architecture differs across ancestral populations remains. Notably, there has been no systematic effort to investigate this in Latinx populations, the largest minority population in the United States currently totaling ~60 million individuals and 18% of the total population. GALA was developed to help address this gap.

Methods: GALA was first assembled ad hoc to enhance genomic diversity in the ASC and comprised of sites within the USA (Seaver Autism Center, University of Miami, University of California, Davis), Brazil (Universidad De São Paulo), Colombia (Universidad de los Andes) and Peru (Centro AnnSullivan del Perú). GALA has recruited over 900 Latinx individuals (mostly trios) diagnosed with autism.
Samples were genotyped and sequenced and incorporated into the ASC and the Psychiatric Genomics Consortium. GALA has recently received NIMH support to recruit, sequence and analyze an additional 1600 Latinx trios focusing on rare genetic variation.

Results: We analyzed de novo mutation rates as a function of ancestry in the most recent study of the ASC (Fu et al. 2022). We observed that the signal is overwhelmingly found in the most conserved genes, irrespective of ancestry.

We are now analyzing data from the existing and emerging GALA samples, focusing on de novo variation. The top 10 genes in the analyses to date are SYNGAP1, SHANK3, DYNCH1, PTEN, CHD8, CACNA1D, RERE, MED13, and SCN2A. The findings implicate known autism genes, consistent with the molecular risk architecture being shared across ancestries.

Conclusions: Admixed populations (where ancestral components from 2+ major groups are represented) present unique challenges in genetics, since the ‘local’ genomic context, i.e., ancestry at the specific chromosomal location, should be considered. The vast majority of minority populations in the USA are admixed (e.g., African American, Latinx), and there is a pressing need to include admixed populations in genomics. Latinx populations include ancestral components from 3 (or more) groups (African, European, and indigenous Americans) and are hence one of the most interesting and challenging examples of recently admixed groups. Our analyses are consistent with the hypothesis that the rare mutational burden for autism does not differ across ancestries and that there is extensive overlap between genes identified. Our results support continued autism gene discovery across populations. Biology, here reflected as genes that are intolerant to deleterious variation due to critical function and dosage sensitivity, is universal and not impacted by “local” genetic processes. Incorporating rare and common standing variation is more challenging, but we and others are working on such approaches.

414.240 (Poster) Identifying Gene-Gene Interactions Associated with Protective Effects in ASD Males and Females

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Background:

Many genetic variants have been linked with the development of ASD, but less attention has been given to variants associated with a reduced risk of developing ASD, which is more prevalent in males than in females. Examining how patterns of potentially protective variants differ in effect between males and females may help us understand the reasons for the sex difference in ASD presentation. Understanding the protective mechanisms may also provide targets for intervention.

Objectives:

We aim to identify patterns of genetic variants linked to reduced risk of ASD. We plan to separately analyze these patterns in both male and female populations with the goal of better understanding how the interaction of protective variants differ between the two.

Methods: We used the SFARI SPARK dataset consisting whole exome data of 59,819 individuals, 31,139 of which were diagnosed with ASD. 10,600 high significance genetic variants were selected from the SPARK data using an FDR adjusted Chi-Square GWAS to identify variants which occurred at significantly higher or lower frequencies between the ASD and non-ASD populations. A modified version of the STUCCO contrast set mining algorithm was applied to identify patterns of variants disproportionately associated with ASD non-diagnosis. Contrast mining was run on both male and female populations separately. The relationships observed within high significance patterns were then aggregated into a network representation.

Results:

Figure 1 and Figure 2 show relationships observed in highly significant patterns in both male and female populations with orange connections showing relationships which appear in both populations. Less significant relationships were excluded for readability. DUSP15, which has previously been linked to ASD, and OSBP2 are prominent genes in both networks, but other relationships had specificity for males or females. The male network shows significantly fewer relationships which are entirely absent from the female network, such as in the relationships of DUSP15 and OSBP2 to GUCY2C/C12orf60. In contrast, the strong relationship between DUSP15 and SEMA3F is present, but dramatically weaker in the male population as compared to the female population.

Conclusions:

We observe differences in how genetic variants appear to interact between males and females to produce an effect which is associated with reduced risk of ASD. These differences in the male and female networks may help to explain ASD sex differences. This may also allow exploration of novel targets for intervention.
Impact of Selected Single Nucleotide Polymorphisms in OXTR and AVPR1a Genes on Their Expression in Persons with ASD.

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Background:

Autism spectrum disorder is a heterogeneous group of disorders that affects virtually every population, regardless of their ethnic or socioeconomic origin. In recent years, the attention of researchers has been drawn to the participation of the oxytocinergic and vasopressinergic systems in the development of autism spectrum disorders. A relatively large number of studies have investigated the association of SNPs in these genes with the development of ASD, however, there is a lack of studies in the literature focusing on their actual effect on expression and on the effect of their expression on the risk of ASD.

Objectives:

The aim of this study was to assess the levels of expression of OXTR and AVPR1a genes and evaluate their links with both risk of ASD and genotypes of the most studied polymorphisms.

Methods:

The study included 132 people, 77.5% of whom were male (n = 100). 113 participants (85.6%) were diagnosed with autism spectrum disorders confirmed by the ADOS-2 test conducted by a certified diagnostician. In this group, men constituted 76.1% of the population (n = 77). The remaining 28 people did not have a diagnosis of autism spectrum disorders, and in the ADOS-2 study they obtained the result below the cut-off level. The mean age in the whole group was 14.4 years (95% CI: 13.92-14.93).

Results:

Results: Significant decrease in expression of the OXTR gene was found in case of rs53576 where presence of the alternative allele (G) was linked to the 20% decrease in expression (2^(-ΔΔCt) = 0.8). In case of AVPR1a alternative allele (T) of SNP rs10877969 was linked to the 20% increase in the gene expression(2^(-ΔΔCt) = 1.197). SNPs rs2254298 (2^(-ΔΔCt) = 0.97) and rs7294536 (2^(-ΔΔCt) = 0.97) did not influence expression of the appropriate genes in significant way. In comparison between the test and control group in participants with confirmed diagnosis of ASD 13% lower expression of AVPR1a was found (2^(-ΔΔCt) = 0.87).

Conclusions:

Genotype of SNPs rs53576 and rs10877969 significantly influenced the levels of expression of the genes OXTR and AVPR1a respectively. In case of rs2254298 and rs7294536 observed effects were negligible. Presence of ASD diagnosis was linked to the 13% lower expression of AVPR1a. Abnormalities in AVPR1a expression seem to be more important for the development of autistic traits than the more attention-grabbing gene abnormalities for the oxytocinergic system.

Inducible Calling Cards: A Mouse Reagent for Temporally Controlled Recording of Neural Activity and Activity-Dependent Gene Expression

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Background: Genetically identical rodents often display individual behavioral responses to the same manipulation. For instance, identically reared mice demonstrate differential levels of social motivation and learning for an age- and sex-matched stimulus. Identifying the molecular landscapes and neural circuits that mediate these individual differences may help elucidate underpinnings of social motivation. However, to identify pre-existing factors that underlie individual differences, molecular states need to be recorded or preserved before phenotypic read-out in the same animal. Current techniques for molecular read-out require prematurely sacrificing the animal, while phenotypic read-out destroys the molecular state from before the manipulation.

Objectives: Here, we introduce mJun-iCC, a novel transgenic mouse tool to nondestructively record molecular states in the live mouse for later read-out. With mJun-iCC, we will be able to 1) fluorescently tag transiently active neurons and 2) record their activity-dependent gene expression for post-mortem read-out.
Methods: mJun-iCC introduces temporal control to Calling Cards, a recently published method to record transcription factor-DNA interactions nondestructively in the live mouse brain. To enable temporal control, mJun-iCC contains a tamoxifen-inducible domain, which allows specification of time windows for fluorescent tagging and recording. We use both fluorescent reporters and next-generation sequencing in vitro and in vivo to evaluate the efficacy of mJun-iCC.

Results: We demonstrate proof-of-principle in the mouse brain that mJun-iCC only records under control of tamoxifen and requires induction by neural activity. Next, to validate the broad applicability of mJun-iCC, we show that mJun-iCC records activity-dependent gene expression in response to behavioral stimulus in relevant brain regions. Finally, we benchmark the mJun-iCC transgenic reagents and characterize efficacy, general health, and behavior of these animals.

Conclusions: Our results indicate mJun-iCC may uniquely allow retroactive, temporally controlled analysis of molecular landscapes and neural activity prior to environmental manipulation. We anticipate mJun-iCC will have broad applications with epigenetic and circuit mapping and enable significant advancements for research into social motivation, early-life adversity, and autism models.

414.243 (Poster) Interaction between Maternal and Progeny Glutathione S-Transferase Genes in Relation with Autism Spectrum Disorder in Jamaican Children

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Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder. Although the etiology of ASD is not completely known, it is believed to involve complex interactions between/among genes or gene-environment interaction.

Objectives: In this research we investigated the association of genotypes for three metabolic glutathione S-transferase (GST) genes (GSTM1, GSTT1, and GSTP1) in both mothers and their progeny with ASD case status in the children, and with ASD severity only in the children with ASD.

Methods: We used data from 68 pairs (n=136) of Jamaican children (2-8 years old) with ASD and their 1:1 sex-and age-matched typically developing (TD) controls who were enrolled in the Epidemiological Research on Autism in Jamaica (ERAJ) study. The genotypes for GST genes were also evaluated in mothers of the enrolled children. We applied univariable and multivariable Conditional Logistic Regression (CLR) models to explore additive and interactive effects of GST genotypes in mothers and their progeny in relation to ASD status, as well as ASD severity as measured by the Autism Diagnostic Observation Schedule-Second Edition (ADOS-2) total comparison score in children with ASD.

Results: In univariable analyses, we did not find any significant associations of the maternal GST genes with ASD in children (all \( P > 0.3 \)). However, we found that the odds of ASD in children who were homozygous for the GSTT1 deletion allele (DD) was 5.5 times greater than in those with at least one active GSTT1 allele (I/*) [Matched odds ratio (MOR) (95% confidence interval (CI)) = 5.5 (1.9, 16.0); \( P = 0.0017 \)]. In the interactive multivariable models, although we did not identify a significant interaction between progeny and maternal GST genes in relation to ASD (all \( P \geq 0.06 \)), we found significant associations between children’s genotype for GSTT1 and ASD only among children whose mothers had certain genotypes for GSTT1 and GSTP1. Specifically, among children whose mothers had GSTT1 DD genotype, the odds of ASD in those with GSTT1 DD genotype was 19.8 times that in children with GSTT1 I/* [MOR (95% CI) = 19.8 (2.5, 157.6); \( P = 0.0048 \)]. Additionally, we found that among children whose mothers were homozygous Val/Val for the GSTP1 Ile105Val polymorphism, the odds of ASD in children with GSTT1 DD genotype was 14.3 times greater than in children with GSTT1 I/* [MOR (95% CI) = 14.26 (1.294, 157.1); \( P = 0.030 \)]. Furthermore, we identified a significant interaction between maternal and children’s GSTM1 genotypes in relation to ASD severity (Interaction \( P = 0.02 \)). Specifically, among children whose mother had I/* genotype for GSTM1, those with GSTM1 DD genotype had less severe ASD than those with GSTM1 I/* genotype [OR (95% CI) = 4.17 (1.39, 12.5); \( P = 0.01 \)].

Conclusions: Multiple significant associations were found with ASD case status or ASD severity when gene-gene interactions for the GST genes were investigated. Such findings indicate that no single gene affects the association with ASD outcome status or severity, but rather the presence of multiple factors may have significant associations with increased odds of ASD outcomes and/or increased severity of ASD.
Background: While the diagnostic yield of genetic testing in autism is approximately 20%, the clinical utility of genetic testing to help understand longitudinal health outcomes and service needs for autistic children and youth remains unclear.

Objectives: The objectives of this study were to (1) demonstrate the feasibility and potential of linking clinical, genomic, and administrative health data and (2) to better characterize the clinical impact and utility of having a genetic diagnosis for autistic children and youth. To meet these objectives, we conducted an analysis to determine whether carrying an underlying genetic variant is associated with differences in health system utilization among a cohort of children with a confirmed diagnosis of ASD. We hypothesized that a genetic diagnosis in autism would be associated with higher health system utilization, including higher overall health care costs.

Methods: The study population consisted of 415 autistic children and youth (mean age 9 years) who underwent whole genome sequencing through a translational neuroscience program (Province of Ontario Neurodevelopmental Disorders Network- POND). Genome sequencing data were used to identify children carrying pathogenic variants (copy number and single nucleotide variants) in 74 known genes with developmental impact. Participants’ research and genetic data were linked to their longitudinal health service utilization using Ontario health administrative databases. Physician, specialist, hospital visits, and total healthcare costs during a 3-year look-back window from POND recruitment were examined and compared between autistic children and youth with and without an underlying genetic variant.

Results: A total of 83 (20%) of participants carried a pathogenic or likely pathogenic genetic variant. Clinical, and demographic characteristics were similar between both groups. Health system utilization was comparable between both groups as well, except for visits for mental health concerns. Children with a genetic variant were less likely to seek psychiatric care (including psychiatrist visits: 19.3% vs. 34.3%, p = 0.008; and outpatient mental health visit with any physician 66.3% vs. 77.1%, p = 0.04), than those without a variant.

Conclusions: This preliminary analysis highlights the feasibility and potential of genomic and health system data linkage, as well as the possible clinical utility of using genetic data to predict mental health care needs in patients with neurodevelopmental conditions.

Background: Phelan-McDermid syndrome (PMS) is a rare genetic condition primarily caused by a 22q13.3 deletion or pathogenic variant of SHANK3. The clinical presentation is heterogeneous and comprises global developmental delay/intellectual disability, marked speech impairment and other features like hypotonia, medical comorbidities, hyperactivity and autism spectrum disorder (ASD).

Developmental stagnation/regression is not uncommon, and behavioral changes may be notable as individuals age. Some studies report data on psychiatric comorbidities and decompensation in adolescents and adults. Nevertheless, longitudinal evaluations are scarce and our ability to establish developmental trajectories remains limited.

Objectives: Our main objective is to describe the behavioral and autistic symptomatology course of a sample of participants with PMS evaluated at two time points. We used standardized tools for the assessment of ASD, global adaptive functioning and repetitive or otherwise altered behaviors.

Methods: Fifty-three participants (88%) from the cohort of Burdeus et al. (2021) consented to participate in a follow-up evaluation, ~4 years after visit 1 (V1). We repeated the assessments, which consisted of the evaluation of autistic symptoms using the ADOS-2 and several scales measuring altered behavior (ABC-C, RBS-R) and adaptive behavior (Vineland-3). We present longitudinal variations in a descriptive fashion, informing of mean score changes and percentage of individuals showing no change, increases or decreases in the mentioned tools. Evaluations are ongoing; once the final sample is available, we will analyze the significance of these changes.

Results: Preliminary results of 31 participants (48% female) are available, with a mean age at V2 of 12.29 years (SD=5y). The average time lapse between V1 and V2 was 46 months (SD=5m). Regarding adaptive behavior, mean standard scores for all domains showed a global
decrease; however, around 50-60% of the participants showed equal or increased scores in the “Communication” and “Socialization” domains. Autistic severity measured with ADOS-2 CSS appeared to increase with age, with around half of the participants scoring higher at V2, especially in the “Total” and “Social affect” domains. At V2, six out of 8 participants stayed under the cut-off score relative to V1, while 3 previously above the ASD cut-off lowered their score.

Concerning repetitive behaviors, stereotypic and insistence in sameness showed a decreasing tendency in over half of the sample, while compulsive and restrictive behaviors appeared stable or increased. Agitation or irritability, as well as hyperactivity, also appeared decreased, with around 75% of participants scoring lower on V2.

Conclusions: Preliminary results of behavioral change in several domains are variable. The informed decrease in adaptive behavior is unsurprising, consistent with the phenomenon of “growing into deficit”. ADOS-2 CSS scores hint to a slight increase in autistic severity, however, significance of this finding must be explored. Five individuals (26%) differed in their ADOS-2 classification, both due to increases and decreases in their scores. Irritability and hyperactivity appeared to drop with age, and so did insistence in sameness. Stratification based on genetic information, as well as clinical or demographic characteristics, such as verbal ability or sex, may provide more details on the differential clinical courses of individuals with PMS.

414.246 (Poster) Mass-Spectrometry Based Metabolomic Profiling of Twin Pairs from the Roots of Autism and ADHD Twin Study in Sweden (RATSS)

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Background: Autism spectrum disorder (ASD) is a neurodevelopmental condition with a heterogeneous clinical presentation that affects between 1-2% of the world population. Although many genes and genetic variants have been found to underlie ASD, additional biomarkers are required for aiding diagnoses and identifying clinical subgroups. Recent studies have suggested an association of several metabolites with ASD that could potentially find application as biomarkers. However, more data are required to identify any robust associations. Twin studies are a suitable approach to analyse the contribution of environmental and genetic factors in metabolic profiles. It is especially valuable to analyse differences between monozygotic (MZ) twins that are discordant for ASD to tease out the genetic contributions.

Objectives: We utilized a rare twin sample, the Roots of Autism and ADHD in Sweden (RATSS), enriched for MZ twins who are discordant for ASD, and their urine sample-based metabolomics to search and validate potential metabolite biomarkers.

Methods: In this study, individuals (N=100) of 50 twin pairs were selected from the RATSS study for mass spectrometry-based metabolomics. The participants have a median age of 16, where 39 are female and 37 have a clinical diagnosis for ASD. Metabolites were extracted from collected urine samples and processed using ultra-high performance liquid chromatography (UHPLC; Ultimate 3000, Thermo Scientific) coupled with a mass spectrometer (Q Exactive Hybrid Quadrupole Orbitrap, Thermo Scientific). Differential metabolomic analysis for 208 metabolites was performed using the drgee package in R, for overall effects using a generalised estimating equations model (GEE) and twin-pair effects using a modified GEE model, with suitable covariates. Metabolomics pathway-level predictions were made in R using annotations from the Kyoto Encyclopaedia of Genes and Genomes (KEGG) pathway database.

Results: Following an unbiased approach, 208 metabolites were detected in urine samples from the study cohort, representing several classes of metabolites such as organic acids, carbohydrates, amino acids, lipids, and nucleic acids. None of the metabolites reach significance after adjusting for the number of tests performed. However, nominal significance was detected for four metabolites in the comparison between the non-ASD and ASD groups. Increased levels were recorded for allantoin (p=0.047), and decreased levels were detected for carnitine (p=0.031), guanidoacetic acid (p=0.23), and pantothenate (p=0.027). Within twin pairs, differences with nominal significance were identified for four metabolites: indole (p=0.038), guanidoacetic acid (p=0.031), uric acid (p=0.029) and xanthine (p=0.045). All these metabolites have been previously indicated in ASD. The effects on pathway level changes are being evaluated.

Conclusions: Only small differences in the metabolite profiles were identified between ASD and non-ASD twins, however the metabolites with nominal significance have been previously reported in other ASD cohorts. These metabolites can be further investigated in larger cohorts which will support the development of diagnostic biomarkers for ASD.

414.247 (Poster) Tuberous Sclerosis Associated Autistic Features – a Retrospective Analysis

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Background: Tuberous sclerosis complex (TSC) is a rare autosomal dominant inherited neurocutaneous disorder. It results from mutations in the genes TSC1 and TSC2 and has multisystem involvement and wide repertoire of presentations including prenatally detected cardiac rhabdomyomas and cortical tubers, other lesions are detected later in life like osseous, renal, or pulmonary lesions. Skin manifestations include hypomelanotic macules, ungual and facial angiofibroma’s and other less common lesions. TSC - associated neuropsychiatric disorders (TAND) are of significant concern and studies quote upto 90% of individuals with tuberous sclerosis complex will have some of these difficulties. Children with TSC are at high risk of Autism Spectrum Disorder (ASD) which consist of problems pertaining to social communication and interaction and restricted or repetitive behaviours or interests.

Objectives: Our objective was to analyse the incidence of TAND and autistic features in children with Tuberous Sclerosis Complex

Methods: Retrospective data from a tertiary care center, with pediatric neurology and Autism specialty clinics was studied via available records during the period of Jan 2018 to September 2022. Twenty-six children with tuberous sclerosis complex were identified, and their clinical data were analysed.

Results: All assessed children (N=26) had one or more difficulties as per the TAND checklist. 18 of the 26 children, fulfilled Diagnostic and Statistical Manual -5th edition (DSM-V) criteria for ASD. There were 10 males and 8 females in the group. Skin manifestations in form of hypomelanotic macules were seen in all the children (100%) and other features like adenoma sebaceum were seen in 10/18 (56%), shagreen patch in 7 (40%), ungual fibromas in 2 (11%). Of these 18 children with ASD – 17/18 (94%) of had had drug refractory epilepsy and with minimum age of onset of seizures being 9 months. 7 (40%) of them required more than three anti-seizure medications, 2 (11%) were on dietary therapy. 3 (17%) children were on mTOR inhibitors (Everolimus). Baseline average CARS-2 (Childhood Autism Rating Scale-edition 2) score was 40 (range 34-48). Most common co-morbidity apart from epilepsy was hyperactivity and impulsivity (12/18; 67%), followed by sleep related problems including increased latency, frequent awakenings, and reduced sleep duration (7/18; 39%).

Conclusions: TAND especially syndromic ASD represents a large burden of neurological disease in children with TSC. Poorly controlled epilepsy may be a major contributor to these manifestations. Apart from the other multidisciplinary care, ASD in these children requires early referral for ABA therapy (Applied Behaviour Analysis) and medications, for optimal outcome. Early screening using TAND checklist and thorough evaluation of the high-risk population should be instituted timely in disease course.

414.248 (Poster) The Variability of the ASD Phenotype in Monogenic Disorders: A Study in Neurofibromatosis Type 1

Background: The DSM-5 classification Autism spectrum disorder (ASD) covers a heterogeneous spectrum of phenotypes. It has a strong genetic component, which, insofar it can be pinpointed in individuals, is also very heterogeneous. The genetic component can be a monogenic disorder with a high impact on the behavioural phenotype, a rare variant increasing the likelihood of developing ASD, or a less traceable polygenic mechanism. Whether the genetic diversity regarding the etiology of ASD also accounts for the phenotypical variation is unclear. Persons with neurofibromatosis type 1 (NF1), a monogenic disorder, often have neurodevelopmental issues, including ASD. This suggests that the NF1 mutation is involved in the development of ASD, making NF1 an interesting model to study the influence of a specific genetic mutation on the variability of the ASD phenotype. Earlier research indicated a general shift towards ASD traits in the NF1-population, as well as a higher prevalence of an ASD diagnosis.

Objectives: We study the developmental phenotype of NF1 into more detail, and ASD traits in particular, in a population of NF1-children, regardless of prior suspicion of ASD. We consider the variability of the ASD phenotype and assess how several validated instruments measuring ASD traits relate to categorical ASD diagnoses in a specific genetic condition.

Methods: We compared 70 patients with molecularly confirmed NF1 (aged 3 to 16 years) to peers with idiopathic ASD, using questionnaires pertaining to various developmental domains, a diagnostic interview (the Diagnostic Interview for Social and Communication disorders, DISCO), and a standardized observation (the Autism Diagnostic Observation Schedule, second edition, ADOS-2).

Results: We observe a marked variability on most developmental domains in the NF1 group, and this finding also applies to ASD phenotype, even when comparing to idiopathic ASD. Furthermore, in the NF1 group we found poor diagnostic agreement between several instruments, of which some are commonly used to study ASD in monogenic syndromes. Both the SRS and the ADOS estimate the ASD prevalence in our NF1 sample to be around 40%, but when classifying individual participants they agree on only 48.2% of the participants. According to the DISCO on the other hand, only 7.7% of the NF1 sample receive an ASD classification.

Conclusions: Our findings in children and adolescents with NF1 do not support the hypothesis that more homogeneity in the genetic factors leading to an increased likelihood of ASD results in a significantly less variable ASD phenotype. In addition, our findings urge us to adopt a critical approach of ASD research in NF1 and other monogenic disorders.
414.249  (Poster) Role of FMRP in Regulating the Ribosomal 2’O Methylation in Human Embryonic Stem Cell and Its Differentiation
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Background:

Ribosomes are macromolecules present in the cell and are an integral part of the translation machinery. There are many reports suggesting ribosomes are heterogeneous. Factors contributing to this may arise from both rRNA and proteins. FMRP is a RNA binding protein and loss of which causes the Fragile X syndrome (FXS). Previously we showed that FMRP interacts with C/D box snoRNA and regulate 2’O methylation of ribosomal RNA.

Objectives:

We studied how the absence of FMRP brings the changes in the 2’O methylation in human embryonic stem cells (ESCs) and their differentiation

Methods:

To understand the differential methylation of rRNA during differentiation along the neuronal lineage, we differentiated the human embryonic stem cells into neuronal stem cells and then to cortical neurons. Total RNA was alkaline digested and 2’O methylation positions are mapped by ribometh sequencing

Results:

Interestingly, we found more heterogeneity in the 2’O methylation in the embryonic stem cells (pluripotent state) than in the neuronal state (terminally differentiated). This data provides new insight into how rRNA 2’O methylation can contribute to defining the pluripotent nature of embryonic stem cells. Maps of 2’O methylation residues across the 80S ribosome suggests that they position around key sites that interact with RNA binding proteins for possible translation regulation. We have also observed the major difference in methylation pattern in wildtype and Fmr1 KO in stem cell state rather than at neuronal state.

Conclusions:

We hypothesize that the presence of FMRP brings more heterogeneity in the stem cell state in comparison to neuronal stem cells which may influence the rate and timing of neuronal differentiation. Overall this study brings a new concept of ribosome heterogeneity and defines the role of FMRP in embryonic stem cells and their differentiation.

414.250  (Poster) SLC6A4 and BDNF Polymorphisms Modulate Acquisition of Adaptive Behavior Skills in Children with Autism
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Background:

Children with autism demonstrate a range of neurodevelopmental differences which often result in challenges with adaptive skills. Adaptive functioning is assessed routinely in clinical practice as a measure of severity of symptoms, and improvements are assumed to reflect response to treatments over time. However, genetic factors may also moderate the response to medical and behavioral intervention, and thus may influence adaptive behavior outcomes. Among the common genetic variants demonstrated to affect response to environmental influences are changes in the promoter region of the serotonin transporter protein SLC6A4 (5HTTLPR); specifically, the short (S) allele has been associated with increased susceptibility to cognitive and behavioral stress. Similarly, brain-derived neurotrophic factor (BDNF) variants may affect neuronal plasticity, which is implicated in the pathogenesis of autism.

Objectives:

The primary aim of this study was to examine longitudinal adaptive behavior outcomes in children with autism currently receiving clinical care, including applied behavior analysis (ABA) therapy and medical treatment. The second aim of this study was to evaluate differential change in adaptive behaviors based on single gene polymorphisms (SNPs) hypothesized to affect cognition and behavior, specifically SLC6A4 5HTTLPR and BDNF Val66Met.
Methods:

Children with a diagnosis of autism who had clinically undergone pharmacogenomic testing (N = 157) were evaluated with the Vineland Adaptive Behavior Scales up to 7 times between the ages of 20-90 months. We constructed multilevel models to characterize growth curves within each adaptive behavior domain including Adaptive Behavior Composite (ABC), Communication, Socialization, and Daily Living Skills (DLS). We included a Time × SLC6A4 5HTTLPR and Time × BDNF Val66Met interaction term (in separate models) to compare relative rates of growth based on genetic background.

Results:

Multilevel models showed a main effect of time, such that there was an improvement in adaptive behaviors over the course of treatment for both cohorts in all domains (p<0.02). There was a significant SLC6A4 5HTTLPR × Time interaction for Communication (p=0.04) and Daily Living Skills (p=0.03) sub-scores but not ABC or Socialization. The significant interaction showed that dosage of the S allele predicted slower or null rates of improvement in adaptive behaviors. Further, results showed a significant BDNF Val66Met × Time interaction on the ABC score (p=0.05), Socialization (p=0.0001), and DLS (p=0.02), but not Communication. The interaction demonstrated more rapid improvement in scores for Val/Val homozygous individuals compared to Met/Met homozygous or Val/Met heterozygous genotypes.

Conclusions:

These results indicate that genetic background influences the rate of change in adaptive behaviors in children with autism. Dosage of the S allele of SLC6A4 5HTTLPR predicted poorer improvement in adaptive behaviors. This may indicate that susceptibility to environmental stress modulates developmental trajectories in children with autism. Similarly, the Val/Val homozygous genotype in BDNF Val66Met predicted greater improvement in adaptive behaviors relative to Met/Met or Val/Met. Results demonstrate the potential utility of screening for common genetic polymorphisms to help predict clinical outcomes and potentially to guide individualized treatment plans.

**414.251** (Poster) Sex-Differentially Expressed Genes in the Developing and ASD Cortex Implicate Glial Function in Sex-Differential ASD Risk


Background: Autism spectrum disorder (ASD) has a consistent 4:1 male prevalence, suggesting a role for sex-differential biology in risk. Defining molecular differences between males and females in the brain will advance understanding of how sex impacts neurodevelopment and disorder risk. Previous studies of human adult cortex show subtle male-skewed expression of glial-associated genes that are coordinately elevated in the ASD brain, but it is unknown whether this sex-differential pattern emerges in early cortical development or is preserved in ASD brain.

Objectives: We sought to quantify sex-differential gene expression in two under-studied biological contexts relevant to ASD: neurotypical prenatal development, and in ASD cases. By comparing sex-differentially expressed genes (sex-DEGs) with ASD risk genes and affected molecular pathways, we aimed to identify putative mechanisms involved in sex-differential ASD risk.

Methods: We analyzed sex-differential expression and co-expression patterns in prenatal dorsolateral prefrontal cortex (dIPFC) from BrainVar (14-21 post-conception weeks, PCW; 39 male, 46 female) and in cortical tissue from an independent, published data set generated at UCLA (14-21 PCW; 101 male, 85 female). We tested sex-DEGs for enrichment of risk genes for ASD and other diagnoses, ASD-associated expression changes, and cell type marker genes. To identify sex differences preserved or altered in ASD, we also quantified sex-differential expression in published RNA-seq data from frontal cortex of ASD (34 male, 9 female) and control individuals (37 male, 8 female).

Results: In BrainVar, we observe 69 significant sex-DEGs at FDR≤0.1 (30 X chr, 19 Y chr, 20 autosomal) and an extended set of 227 sex-DEGs at p≤0.05 and fold change >1.2. ASD risk genes from exome sequencing are not enriched among either set of sex-DEGs, but the extended set of male-skewed genes are enriched for ASD-upregulated, microglial- and immune-associated CTX.M19 (OR=6.75, p=0.01; Fisher’s exact test) and CD11 (OR=5.5, p=0.008) modules. Three co-expression modules evident in both sexes are enriched for both ASD risk genes and either vascular or neuronal cell markers, while sex-specific modules are not enriched for ASD risk genes. Similar to BrainVar, sex-DEGs from the UCLA data set do not overlap with ASD risk genes, while male-biased DEGs show trending enrichment for the CTX.M19 module (OR=3.86, unadjusted p=0.05), implicating elevated expression of CTX.M19 genes in both ASD pathology and male-typical cortical neurodevelopment.
Background: The underlying molecular mechanisms responsible for the etiology of autism and its sex-biased prevalence remain largely elusive. We have previously shown that children with non-syndromic low-functioning autism exhibit a sexually dimorphic pattern of relative telomere length (RTL) with autistic male children having significantly shorter RTL than autistic females, healthy controls, and paired siblings.

Objectives: The main goal of the current study was to examine the levels of telomeric oxidized base lesions among male and female autistic children and compare them to those in sex-, age-, and geographical location-matched healthy controls and paired siblings. We also wanted to find out if the levels of telomeric oxidized bases associate with the sexually-dimorphic nature of RTL among autistic children.

Methods: Levels of telomeric oxidized base lesions were measured by extracting genomic DNA from saliva samples and employing a quantitative PCR (qPCR)-based method previously described by Nathan O’Callaghan and colleagues (O’Callaghan et al., 2011).

Results: Our data show that both male and female children with autism exhibit substantially higher levels of oxidative base lesions at their telomeres than healthy controls and paired siblings. These elevated levels of telomeric oxidized bases show a direct correlation with RTL values in autistic children, with a significant impact coming from the male children with autism despite having shorter telomeres. There is no association between the levels of telomeric oxidized bases and age in either the autistic children or healthy controls, hinting that these oxidized bases are established early during development.

Conclusions: These findings open a fresh angle into autism spectrum disorders (ASD), raise new questions and lay the foundation for further research into the underlying molecular mechanisms involved in ASD. Telomeric oxidized bases may serve as new biomarkers for childhood autism.

Background: Among individuals with autism spectrum disorders (ASD) about 20% of cases are due to known genetic disorders, so-called syndromic ASD. Prader-Willi syndrome (PWS), a rare genetic disorder that results from lack of expression of paternally-derived genes on chromosome 15q11-13, is an example of syndromic ASD since 30% of patients have also an ASD diagnosis. Better understanding of the neural basis of PWS could help elucidate shared mechanisms underlying social cognition impairments in these disorders.

Objectives: No studies have investigated brain perfusion abnormalities in infants with PWS. Thus, the aim of this work was to investigate putative brain perfusion abnormalities in babies with PWS using arterial spin labelling magnetic resonance imaging (ASL-MRI).

Methods: This study included 10 babies with PWS (5 males, age = 11 ± 3 weeks) and a group of 7 age matched controls (3 males, age = 13 ± 3 weeks). All infants underwent ASL-MRI sequence during natural sleep on a General Electric 3T MRI scanner at Necker Hospital, Paris. Using a voxel-wise analysis, we compared whole brain rest cerebral blood flow (CBF) between patients with PWS and controls. The statistical analyses were conducted within the framework of general linear model (GLM) in SPM12 software, on normalized and smoothed CBF images, using age as a covariate.

Results: Compared to controls, in infants with PWS the voxel-wise whole brain analysis showed a significant increase of rest CBF mainly in the left superior temporal gyrus (corrected for cluster FWE; p < 0.001), but also in the right pallidum (family wise error corrected for
Background: Cortisol, a physiological marker of stress, is positively attuned in neurotypical (NT) mother-child dyads (e.g., maternal cortisol predicting child cortisol), but this attunement is moderated by maternal characteristics (DePasquale, 2020). Preliminary evidence suggests that maternal-child cortisol attunement is weaker in autistic children (Saxbe et al., 2017), yet little is known regarding moderation of cortisol attunement in neurodevelopmental populations. Parent-reported stress is elevated in mothers of children with Autism Spectrum Disorder (ASD) and Fragile X Syndrome (FXS; Baker-Ericzén et al., 2005; Potter et al., 2022) and may be an important moderator of maternal-child cortisol attunement. Determining parental stress’ impact on cortisol attunement may inform interventions and will broaden the field’s understanding of how behavioral and physiological indices of stress interact in neurodevelopmental groups.

Objectives: To determine how maternal-child cortisol attunement (maternal cortisol predicting child cortisol) is moderated by parental stress in FXS, ASD, and NT.

Methods: Salivary cortisol was collected from 84 mother-child dyads ($n_{ASD}=27$, $M_{ASD}=45.08$ months; $n_{NT}=28$, $M_{NT}=43.32$ months) before assessments. Cortisol values were natural log transformed (Hanrahan et al., 2006; Adam & Kumari, 2009). The Parent Stress Index (Abidin, 1995) measured parental stress and is comprised of three subscales (Parent-Child Dysfunctional Interaction (P-CDI), Difficult Child, and Parental Distress) and a total score, where higher scores indicate more stress. Per group, linear models with interactions assessed how parental stress moderated the effect of maternal cortisol on child cortisol, controlling for nonverbal IQ, time of saliva collection, and child age.

Results: P-CDI and Difficult Child did not moderate maternal-child cortisol attunement for any group ($p>0.05$). For NT children only, less Parental Distress resulted in stronger maternal-child cortisol attunement ($b=-0.053$, $p=0.046$; Figure1A). For the ASD and FXS groups, Parental Distress was not associated with stronger or weaker maternal-child attunement; when mothers had elevated cortisol (>mean), child cortisol did not substantially differ by Parental Distress levels (ASD: $M_{ASD}=1.84\mu g/dl$ vs. $M_{ASD}=-1.54\mu g/dl$; FXS: $M_{FXS}=1.48\mu g/dl$ vs. $M_{FXS}=-1.65\mu g/dl$). For NT children only, less Total Stress resulted in stronger maternal-child cortisol attunement at a trend level ($b=-0.025$, $p=0.058$; Figure1B).

Conclusions: Parental stress did not moderate maternal-child cortisol attunement in children with ASD or FXS. For NT children, however, maternal-child cortisol attunement was stronger when mothers reported less stress, suggesting that mothers who are less stressed may be more available to attend to their children, facilitating stronger attunement. This aligns with evidence showing that mothers with more stress engage in fewer mother-child interactions (Clowits et al., 2016) and are less sensitive to their children (B.T. Dau et al., 2019), where less sensitivity minimizes maternal-child attunement (Atkinson et al., 2013). Further, the strongest moderation effect occurred with Parental Distress, indicating that perceived parental efficacy (not parent-child interactions, perceptions of how challenging a child is, or composite stress) may drive attunement. These results suggest that parental stress may make NT children, but not those with neurodevelopmental disorders, vulnerable to decreased attunement and could serve as intervention targets. Future work should continue to probe the impact of parental stress on maternal-child cortisol attunement in larger samples across development.


Background: Communication, impaired social interactions and repetitive behaviors. Genetic studies have pointed to hundreds of presumptive causative or...
susceptibility variants in ASD, making it difficult to find common underlying pathogenic mechanisms and suggesting that multiple
different genetic etiologies for ASDs influence a continuum of traits. Smith–Magenis syndrome is a rare genetic disorder that results from
an interstitial deletion of 17p11.2 and, in rare cases, from a retinoic acid induced 1 (RAI1) gene variant. The prevalence is estimated to be
1/15,000–25,000. Haploinsufficiency of RAI1 is the primary cause of the neurobehavioral and metabolic phenotype in SMS. Individuals
with SMS present with a distinct pattern of mild to moderate intellectual disability, delayed speech and language skills, distinctive
craniofacial and skeletal abnormalities, behavioral disturbances, and, almost uniformly, significant sleep disturbances. Alterations in RAI1
copy number has been also linked to a number of neurodevelopmental disorders including ASD.

Objectives:

We conducted a large-scale association analysis of the ASD MSSNG whole genome sequencing data to elucidate the
prevalence of RAI1 SNVs and CNVs in the ASD population.

Methods:

We accessed the MSSNG database hosting over 11,000 genomes (6080 probands) and queried both SNVs and CNVs. Specifically,
we focused on the prevalence of the classic deletions, microdeletions of (exon 3) and of the causative variants.

Results:

We report a 2.5x enrichment of the major deletion and a >5x enrichment of the frameshift variants as compared to the known prevalence of SMS 1/15,000. Additionally, we report a significant enrichment of RAI1 rare missense variants in comparison to super controls (54/6080 versus 6/2541 P-value<0.002, OR 3.78 CI 1.62-8-81).

Conclusions:

Both ASD patients and SMS patients suffer from sleep disturbances. In this population of individuals with ASD, we report here an
enrichment of variants known to cause SMS. We estimate the enrichment to be at least 2.5-fold and potentially higher than 10-fold
enrichment, considering the types of variants observed in the population. Currently, the prevailing theory is that there is an underlying
circadian pathophysiology causing sleep disturbances in SMS associated with RAI1 haploinsufficiency, as these patients exhibit low
overall melatonin concentrations and abnormal timing of peak plasma melatonin concentrations. This abnormal inverted circadian rhythm
is estimated to occur in 95% of individuals with SMS. The sleep disturbance seen in individuals with SMS may be also the underlying
mechanism in at least a subset of individuals with ASD, especially in those individuals with consequential variants in the RAI1 gene.
Further studies will help delineate the role of RAI1 variants in sleep physiology.

414.256 (Poster) NBS-Ndd Task Force: Landscape Analysis of Neurodevelopmental Comorbidities in Newborn Screening Conditions
Z. Talebizadeh1, J. Taylor2 and A. Brower2, (1)NBSTRN, American College of Medical Genetics and Genomics (ACMG), Bethesda, MD,
(2)NBSTRN, ACMG, Bethesda, MD

Background: Newborn screening (NBS) is the largest public health genetic program in the US with 3.8 million newborns screened for up to
81 genetic conditions each year. Many of these conditions have comorbidities, including autism, neurodevelopmental disorders (NDD),
intellectual/developmental disabilities (IDD), and these comorbidities impact health outcomes across the lifespan. The majority of screened
conditions are inborn errors of metabolism (IEM). PKU, the first condition identified by NBS, is an inherited metabolic disorder that can cause developmental delays and IDD if not treated.

The Newborn Screening Translational Research Network (NBSTRN), a program funded by NICHD since 2008, is charged with developing, maintaining, and enhancing tools, resources, and expertise in support of NBS research. One of the tasks led by NBSTRN is to provide direction for developing question/answer sets used in the Longitudinal Pediatric Data Resource (LPDR) to create consensus-based, and standardized common data elements (CDEs) for NBS conditions. LPDR is a web-based application designed to enable the collection, analysis, sharing, and reporting of longitudinal laboratory and clinical data on newborn-screened individuals. Based on feedback received from the NBS stakeholders, the following needs have been identified: 1) evaluate the feasibility of the existing LPDR data to comprehend neurodevelopmental trajectories, and to 2) identify, refine, and/or develop CDEs for collecting longitudinal NDD data based on the evidence-based evaluation. The NBS-NDD Task Force has been formed to address these needs by conducting a systematic landscape analysis.

Objectives: The overarching goal is to develop a strategy roadmap for utilizing the NBS system to understand neurodevelopmental outcomes.

Methods: A mixed methods approach (data mining, community-based participatory approach, focus group, and systematic reviews) was used to conduct a feasibility assessment, including identification of needs and priorities. Data mining included examining health information from a completed, 10-year natural history study of IEMs, called Inborn Errors of Metabolism Collaborative (IBEMC).

Results: 44 IEM conditions are currently included in the Recommended Uniform Screening Panel. De-identified data from the IBEMC projects are available for secondary data analysis in LPDR. One of the IEM conditions included is MCAD (Medium-chain acyl-CoA dehydrogenase deficiency). The IBEMC enrolled 381 subjects with MCAD, of which 69% had longitudinal data (2 or more visits after the initial intake). Developmental assessment was done for 74% of MCAD subjects at visit 1, but the rate did not remain constant in subsequent visits. Furthermore, Ingenuity Pathway Analysis (IPA) was conducted to explore the genetic overlap between IEMs and NDD. The IPA analysis could be used to prioritize NBS conditions for NDD assessments.

Conclusions: The expected outcome is to identify NDD question/answer sets that can be incorporated into the LPDR and disseminated to the NBS research community for inclusion in research projects of conditions that are part of or candidate for NBS. Findings from this landscape analysis can inform future efforts toward advancing research infrastructure for this established public health program. The renewed awareness of the risk of autism/NDD/IDD after a positive NBS and diagnosis could lead to improving treatment guidelines for mental health conditions.

414.257  (Poster) NBS-Ndd Task Force: Landscape Analysis of Neurodevelopmental Co-Morbidities in Newborn Screening Conditions

Z. Talebizadeh, J. Taylor and A. Brower, (1)NBSTRN, American College of Medical Genetics and Genomics (ACMG), Bethesda, MD, (2)NBSTRN, ACMG, Bethesda, MD

Background: Newborn screening (NBS) is the largest public health genetic program in the US with 3.8 million newborns screened for up to 81 genetic conditions each year. Many of these conditions have co-morbidities, including autism, neurodevelopmental disorders (NDD), intellectual/developmental disabilities (IDD), and these co-morbidities impact health outcomes across the lifespan. The majority of screened conditions are inborn errors of metabolism (IEM). PKU, the first condition identified by NBS, is an inherited metabolic disorder that can cause developmental delays and IDD if not treated.

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Objectives: The overarching goal is to develop a strategy roadmap for utilizing the NBS system to understand neurodevelopmental outcomes.

Methods: A mixed methods approach (data mining, community-based participatory approach, focus group, and systematic reviews) was used to conduct a feasibility assessment, including identification of needs and priorities. Data mining included examining health information from a completed, 10-year natural history study of IEMs, called Inborn Errors of Metabolism Collaborative (IBEMC).
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Conclusions: The expected outcome is to identify NDD question/answer sets that can be incorporated into the LPDR and disseminated to the NBS research community for inclusion in research projects of conditions that are part of or candidate for NBS. Findings from this landscape analysis can inform future efforts toward advancing research infrastructure for this established public health program. The renewed awareness of the risk of autism/NDD/IDD after a positive NBS and diagnosis could lead to improving treatment guidelines for mental health conditions.

International and Cross-Cultural Perspectives

PANEL DISCUSSION — INTERNATIONAL AND CROSS-CULTURAL PERSPECTIVES

212 - International Adaptations and Applications of a System to Improve Program Quality and Use of Evidence-Based Practices

Panel Chair: Samuel Odom, Frank Porter Graham Child Development Institute, University of North Carolina at Chapel Hill, San Diego, CA

Discussant: Ann Sam, Frank Porter Graham Child Development Institute, Carrboro, NC

Providing high quality programs that support the learning and development of autistic children and youth is an international issue. Research has yielded substantial empirical information about assessment approaches and practices. This research, however, exists in academic journals and often originates in the United States. The emergence of the iSciences (e.g., implementation science, improvement science, information science, dissemination science) has raised awareness that empirical findings have to be converted into practical information and communicated in culturally responsive ways if they are to be utilized by practitioners. In the US, the National Professional Development Center on Autism (NPDC) designed an assessment of autism program quality (Odom et al., 2018), identified through systematic reviews a set of evidence-based practices (Steinbrenner et al., 2020), and demonstrated the efficacy of the program model (Odom et al., 2013; Sam et al., 2021). Also, NPDC developed free online learning modules for each EBP, which has been accessed by over 275,000 practitioners world-wide. However, utilizing the practices within the US and other countries requires cultural adaptation to fit the specific domestic and international contexts. The purpose of this panel is to describe the cultural adaptation and use of features of the NPDC model in four different international contexts.

212.001 (Panel Discussion) Cultural Adaptation, Content Validity, and Assessment of Autism Program Quality in Swedish Schools

H. Bejnö, K. Wenneborg, S. Bolte and L. Roll-Pettersson, (1)Stockholm University, Stockholm, Sweden, (2)Stockholm University, Stockholm, Sweden, (3)Center for Neurodevelopmental Disorders at Karolinska Institutet (KIND), Department of Women’s and Children’s Health, Karolinska Institutet, Stockholm, Sweden, (4)Department of Special Education, Stockholm University, Nyköping, Sweden

Background: The prevalence of children diagnosed with autism in Sweden has increased placing greater demands on schools to provide high-quality programs for autistic learners. Previous research indicates lack of knowledge among educators about autism, how to promote inclusion, and what constitutes high-quality learning environments. In the U.S. the Autism Program Environment Rating Scale (APERS) has been developed to assess and improve program quality for autistic students in educational setting. APERS has been successfully used in the U.S. as well as in Swedish preschools. However, there are no comprehensive rating scales to assess program quality for autistic children in Swedish elementary school.

Objectives: The aim of this presentation is twofold: 1) describe the process and outcomes of culturally adapting and evaluating content validity and inter-rater reliability of the Swedish elementary school APERS (APERS-Fk/L-SE), and 2) present APERS assessment data on 22 kindergarten and 1-3rd grade classrooms participating in an ongoing study in the Stockholm region.

Methods: To cross-culturally adapt and validate APERS-Fk/L-SE, a step-wise procedure was followed. First, the instrument was translated by a PhD with expertise in autism and psychometrics. Second, our research group provided internal feedback on wording, contents and adaptations. Third, a total of 14 external experts with expertise in autism, habilitation, special education, and psychology were recruited to rate the clarity, completeness and relevance of individual items as well as domains and the scale in its entirety. Fourth, four interviews were conducted with a subset of expert raters to provide qualitative information on potential improvements. Fifth, this version of APERS-Fk/L-SE was tested in 10 classrooms within a pilot study on program quality improvement. Finally, follow-up interviews with school staff
provided further information on potential adjustments of the scale. The final version of APERS-Fk/L-SE was then used in 12 additional classrooms to assess autism program quality. Inter-rater reliability was assessed for a subset (10) of the 22 rated classrooms.

Results: Substantial modifications were needed to adapt the scale to the Swedish kindergarten to 3rd grade context. Three items were omitted and two added reflecting relevant quality features specific to the Swedish context. Furthermore, appropriate items were revised, original examples were modified or new clarifications added. Overall, the expert raters assessed APERS-Fk/L-SE as having a high level of content validity (content validity index [CVI] > 80), and ratings on general impressions of the instrument indicated that the APERS is a much needed albeit time consuming scale to administer. Mean single-measure intraclass correlations among raters was .75 (p < 0.001 95% CI [.71, .79]). Data from the 22 APERS ratings of classrooms indicated poor to moderate program quality, with Learning Environment and Positive Climate the highest and domains reflecting intervention practices (e.g., Communication) the lowest.

Conclusions: APERS-Fk/L-SE has a high level of cross-cultural content validity as well as acceptable inter-rater reliability. However, adaptations were needed to assure relevance within the Swedish context. Current APERS assessment data indicate a need to improve program quality for autistic students in inclusive elementary school classrooms, with specific emphasis on supporting students independence and communication skills.

212.002 (Panel Discussion) Translation, Adaptation and Dissemination of AFIRM in China
Y. Fan, X. He and L. Yu, (1)Center for Autism Research, School of Education, Guangzhou University, Guangzhou, China, (2)South China Normal University Autism Research Center, Guangzhou, China, (3)Center for Autism Research, School of Education, Guangzhou University, Guangzhou, MN, China

Background: In China, there are over 2.5 million children and teenagers with ASD. Reports showed that for the 300,000 therapists and teachers in China there has been a lack of training related to autism (Wang, 2022; Wen, 2015). Results from a survey of service providers showed that only 37% used established interventions (Sun, 2017). Thus, an efficient model of promoting the usage of evidence-based practices (EBPs) nationwide is in need. The Autism Focused Intervention Resources & Modules (AFIRM), developed by the National Professional Development Center on Autism (NPDC), provided free online public access of practical materials of EBPs. The disseminating study of AFIRM reported a promising result of reaching users in US and abroad (Sam et al., 2019). It shed insight on a cost-effective way to improve the situation in China as aforementioned. However, due to the differences between the two countries in culture and other perspectives, adaptations in translation and dissemination are necessary.

Objectives: This study aims to explore the process of translation, adaptation and dissemination of AFIRM for Chinese users.

Methods: EBP Brief Packets from the AFIRM program that contain all the materials and resources for each of the 27 EBPs were translated to Chinese by four postgraduates who are majored in psychology and have experiences in autistic research and practices. The first draft was then reviewed, edited, and proofread by the authors. A focus group of 6 experienced clinicians provided suggestions on cultural adaptation and dissemination. Modifications were made accordingly and the translation was then finalized. An intern on the spectrum worked with an IT colleague on format editing and constructing the website.

Results: Cultural adaptations were made in the materials of 5 EBPs. Unfamiliar items to children in China (like food, TV shows, toys, games) were substituted, for example ‘Pretzels’ was changed to ‘旺旺仙贝’ (a popular crispy snack). U. S. Council for Exceptional Children standards were omitted since they are not applied in China. A dissemination model was designed and adapted to habits of using digital devices among people in China. It contains 1) An WeChat official account for promotion and provision of easy access to the website, 2) The website for free access to all the translated materials, 3) Promotion in conferences and workshops. From December 18, 2021 to October 23, 2022, there were 3,544 followers of the WeChat official account. According to Baidu analytics, the website was visited 23,422 times by 4,702 users from all provinces except Qinghai and Xizang. Introduction to EBPs was presented in 5 research conferences, and there were around 60,000 visits of participants (online and offline). Evaluations gathered through online conferences and WeChat official accounts documented positively the acceptability and useability of the information.

Conclusions: Translation, adaptation and dissemination of materials from AFIRM facilitated the understanding and usage of EBPs in China. The adapted AFIRM information appears to be a valuable tool for supporting teachers’, clinicians’, and therapists’ use of EBPs in China.

212.003 (Panel Discussion) Perceived Social Validity and Attitude Towards Evidence-Based Practice Following the Implementation of the National Professional Development Center on ASD (NPDC) Model in Therapeutic Preschools
A. Waligorska, M. Waligorski; K. Kunczewicz-Sosnowska; K. Paluba; M. Andrezjewska and M. Rupinska, (1)The Maria Grzegorzewska University, Warsaw, Poland, (2)The SOTIS Autism Therapy Center, Warsaw, Poland, (3)The SWPS University, Warsaw, Poland

Background: One of the factors affecting implementation of EBPs in clinical or educational settings is their social validity (NeNeill, 2019). NPDC was developed in the United States. In Poland, there are therapeutic preschool programs similar to the U.S. However, the
social validity of the NPDC model when implemented a novel context such as Poland, has not yet been tested. Such implementation may be affected by perceptions of feasibility of the program and staff attitudes.

**Objectives:** To examine the social validity of the NPDC ASD intervention model and related factors, such as experience and attitudes towards EBP, as part of the 4-year pilot implementation of the NPDC model in 5 therapeutic preschools in Poland.

**Methods:** Two studies were conducted. In the first, participants were 31 therapists and teachers working in 11 preschool groups in the middle of a pilot NPDC model implementation. Experience working with EBPs, attitude towards EBP (EBP2Q, Panczyk et al., 2015 and EBP fidelity were assessed. In the second, 8 supervisors of 5 preschools implementing the NPDC model assessed social validity of the NPDC intervention model (rating of feasibility) and the NPDC quality assessment tool APERS. The form of the APERS measure originated from the parallel Swedish implementation study (Bejnö et al., 2019).

**Results:** In Study 1, both self-assessment and external evaluation (APERS-PE) indicated a high EBP implementation/intervention quality (over 80% of the maximum score). The team members’ attitude towards EBPs were similarly positive. The analysis of variance indicated that contrary to expectations attitude towards EBP was unrelated to the EBP implementation/intervention quality, however there was a high positive relationship between APERS-PE scores and the years of employment in the preschool using EBPs (for external evaluation F(1.27) = 4.91, p = 0.03, eta2 = 0.15; for self-assessment F(1.27) = 6.65, p = 0.02, eta2 = 0.20). In the second study, the social validity ratings of the APERS-PE domains were high, averaging over 93% of the maximum score. The highest scores were obtained for relevance, need for use and lack of an equivalent instrument. The lowest score (79% of the maximum) was obtained for “realistic use in practice”. The whole NPDC model was similarly rated; the mean score of the social validity domains was above 83%. The supervisors rated highest their preference to use the model. The lowest rated domain was realistic use in practice in the Polish context (61% of the maximum score).

**Conclusions:** These preliminary results support the notion that introducing the NPDC intervention in the novel cultural context such as Poland is challenging, as seen in the lowest assessment of the “realism of use” of NPDC model and related assessment tool, APERS-PE. Despite the challenge, the overall social validity assessment suggests the feasibility of introducing the EB NPDC model. Experience of the team members with the NPDC practices in their preschools (but not attitudes towards EBP) related to implementation success/intervention quality. It suggests that having “hand-on” experience may be the most promising factor for supporting the implementation of the NPDC model in the Polish context.

**212.004 (Panel Discussion) Enhancing Capacity for Implementation of Evidence-Based Practice for Autism: California Autism Professional Training and Information Network (CAPTAIN)**


Background: The California Autism Professional Training and Information Network (CAPTAIN) is a multi-agency collaboration focused on dissemination and implementation of autism evidence-based practices (EBPs) across educational, developmental disability and family support sectors in California (Suhrheinrich et al., 2020). Employing the interactive systems framework (Wandersman et al., 2008), we highlight collaboration between a translation system (i.e. National Professional Development Center (NPDC)), a support system (i.e.CAPTAIN), and a delivery system (i.e. providers) as necessary for successful implementation. CAPTAIN supports its network of providers with development of resources and skills to effectively disseminate and implement EBP with fidelity. CAPTAIN uses AFIRM and has recently adapted the NPDC-ASD model and resources to fit the diverse needs and context of California’s system of care.

**Objectives:** The present study examined CAPTAIN provider training, coaching outcomes, and reported needs for additional resources and adaptations to current resources (AFIRM materials and CAPTAIN supports).

**Methods:** CAPTAIN members use of NPDC-ASD resources and the impact of CAPTAIN efforts have been tracked through annual quality improvement data collection and targeted research evaluation. CAPTAIN members (n=232) completed an online survey regarding dissemination and implementation activities and needed adaptations to the AFIRM materials.

**Results:** Data indicate CAPTAIN providers used NPDC resources (or adapted versions of the resources) on autism EBPs to support California providers and family members through training (n=14,334) received training) and coaching (see Table 1). Respondents indicated AFIRM materials were their most used resource, followed by the EBP matrix and definitions. California has the highest number of registered AFIRM users (n=50,201) as compared to all other US states. Table 2 presents a summary of indicated needs. These include resources to support inclusion of EBPs in services for more diverse populations (i.e. adults with autism, English learners) and more accessible resources for families. Based on these data, targeted resources were developed to address identified needs. For example, AFIRM training modules were adapted for use by providers of autistic adults. Additionally, EBPs for autism were aligned with best practices for supporting English learners with disabilities to support integration of strategies.
Conclusions: Providers with direct experience in the field offer useful perspectives on barriers to practice implementation. NPDC resources have been consistently used by CAPTAIN for over 10 years, and more recently have been adapted to meet the needs of providers across service systems as they serve a diverse population of autistic individuals and their families.

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<td><strong>221 - Access to Autism Diagnosis, Services, and Knowledge in Diverse Settings: Using Qualitative and Participatory Research to Understand the Experiences of Under-Represented and Under-Served Families</strong></td>
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**Panel Chair:** Amber Angell, Mrs. T. H. Chan Division of Occupational Science and Occupational Therapy, University of Southern California, Los Angeles, CA

**Discussant:** Daniella Florinéz, Mrs. T. H. Chan Division of Occupational Science and Occupational Therapy, University of Southern California, Los Angeles, CA

Despite progress with addressing autism disparities in some contexts, gaps in our knowledge remain. In the U.S., we know little about Native American populations, who have been largely overlooked in autism research. Despite increased attention to girls in autism research, they remain relatively understudied; and there is a dearth of research about the ‘diagnostic odyssey’ of Latina girls, from both English- and Spanish-speaking families. The Latine population continues to face diagnostic disparities, but we know little about the complex role of stigma in autism knowledge, attitudes, and beliefs. Finally, the global narrative on autism is most often centered on research from high-income countries, and we know little about the autism ‘diagnostic odyssey’ in other contexts. In this panel, we aim to address these gaps by using qualitative and participatory methods with under-studied, under-served groups: 1) Diné (Navajo) in the southwestern U.S.; 2) Girls, including Latina girls in Los Angeles County; 3) Latine families in Portland, Oregon; and 4) Children, families, and healthcare providers in the Greater Accra Region of Ghana. This panel brings together researchers with diversity in neurotype (including a Latina autistic discussant), race/ethnicity, gender, institution/geography, discipline, and tenure status, providing a richness of perspectives on these critical topics.

**221.001 (Panel Discussion) A Qualitative Study on Factors Influencing Access to Autism Services for Diné (Navajo) Parents**

**O. J. Lindly**, D. E. Henderson, C. Vining, C. L. Running Bear, S. Nozadi and S. Bia, (1) Health Sciences, Northern Arizona University, Flagstaff, AZ, (2) Communication Sciences and Disorders, Northern Arizona University, Flagstaff, AZ, (3) A.T. Still University, Phoenix, AZ, (4) Northern Arizona University, Flagstaff, AZ, (5) University of New Mexico, Albuquerque, NM, (6) National University, San Diego, CA

Background: Autism spectrum disorder (autism) is a relatively prevalent, chronic neurodevelopmental condition that can be diagnosed in children who are less than two years old. Access to diagnostic and evidence-based treatment services (e.g., early intensive behavioral therapy) when children are young can help to optimize their health. Still persistent race and ethnicity-based inequities exist in access to autism diagnostic and treatment services for U.S. children. Little is known about inequities in service access specifically for Indigenous children with autism including those who identify as Diné (Navajo), which is the largest federated tribe in the U.S. This information may be useful in planning, implementing, and evaluating equity-focused policy and programs intended to increase autism services access in Indigenous communities.

Objectives: To describe the lived experiences of Diné parents raising children with autism including factors affecting their access to diagnostic and treatment services.

Methods: From June 2021 to June 2022, we conducted in-depth interviews with 15 Diné parents of children with autism ages < 13 years. All interviews were facilitated by a Diné study team member using telephone or videoconference. A brief survey was also verbally administered to gather demographic information. The interview guide was based on constructs from the Modified Sociocultural Framework for Autism Health Services Disparities. Once interview data were transcribed, we used a directed content analysis approach in NVivo to distill themes.

Results: We identified 12 overarching themes. **Themes about experiences accessing diagnostic services** were as follows: (1) for many Diné parents, the diagnostic process was stressful and emotionally fraught; (2) once parents understood that their child needed autism diagnostic services they commonly experienced wait times on the magnitude of months or even years; (3) when parents recognized their child had developmental issues and expressed these concerns to health professionals, clinician training and cultural humility often influenced parents’ subsequent access to autism diagnostic services; (4) protective factors helping Diné parents to access autism diagnostic services included adequate health insurance, Indian Health Service referrals, care coordination, financial aid to travel, an efficient evaluation process, and provider cultural humility. **Themes about experiences accessing treatment services** were as follows: (5) parent perceptions of how much or how little an autism service helped their child could affect access; (6) obtaining referrals and care coordination services affected autism treatment access; (7) social support from family and friends influenced autism treatment access; (8) availability of
and geographic proximity to services impacted autism treatment access; and (9) costs of affected autism treatment access. Themes about ways to improve the autism system of care for Diné families were as follows: (10) greater awareness and understanding of autism among Diné families could improve access to services; (11) some Diné families may benefit from autism support groups; and (12) access to autism services would be easier with increased availability and quality across and around the Navajo Nation.

Conclusions: Increased autism awareness, social support, and service availability and quality may help Diné children with autism and their families to access needed services and to ultimately advance health equity.

221.002 (Panel Discussion) How Do Girls Come to Get an Autism Diagnosis?: Experiences of English- and Spanish-Speaking Families in Los Angeles County

A. M. Angell, M. D. Franklin, J. Lopez, D. C. Florinéz, A. Rodríguez, E. Taylor, J. Rios and M. Guzman; (1)Mrs. T. H. Chan Division of Occupational Science and Occupational Therapy, University of Southern California, Los Angeles, CA, (2)Department of Population and Public Health Sciences, University of Southern California, Los Angeles, CA, (3)University of Southern California, Los Angeles, CA, (4)Mrs. T. H. Chan Division of Occupational Science and Occupational Therapy, Chan Division of Occupational Science at the University of Southern California, Los Angeles, CA

Background: In recent years, girls and women have gained attention as an understudied autism sub-group. Girls are generally under-identified with autism and may be more likely to be misdiagnosed; increasing numbers of women are recognizing in adulthood that they are autistic. Little is known, however, about the autism ‘diagnostic odyssey’ for girls who are diagnosed in childhood, including the barriers and facilitators to obtaining an autism diagnosis and services. Further, there is almost no research on autism diagnostic experiences of girls with intersectional identities, i.e., those from minoritized racial, ethnic, and linguistic groups. Although we know that, as a whole, Latine children face disparities in autism rates and age of identification, Latina girls, from both English- and Spanish- speaking families, have been largely ignored in research.

Objectives: To address this gap, this qualitative study aims to understand the diagnostic odyssey (i.e., pathway to a diagnosis and services) experienced by diverse families of autistic girls.

Methods: We recruited from a Los Angeles area Regional Center. Participants included 21 caregivers from 18 families of 19 autistic girls (one family had twin autistic girls) ages 3 to 11 living in Los Angeles County. We conducted semi-structured narrative interviews with the 21 caregivers via Zoom between September 2021 and April 2022. Ten families were interviewed in English; 8 were interviewed in Spanish. Twelve families identified as Latine/Latino/Hispanic; 5 as mixed racial/ethnic identities; and 1 as Asian. We used a narrative approach and Braun and Clarke’s (2006) thematic analysis to identify overarching themes; and descriptive statistics to characterize important points in families’ narratives (e.g., age at first concerns and diagnosis). All transcripts were coded in NVivo by at least two coders, including those with diverse racial, ethnic, and neurotype identities.

Results: In our sample of 19 autistic girls from minoritized racial/ethnic groups, the girls were largely identified with autism at an early age compared to national averages for underrepresented groups (mean age at diagnosis 34 months). This may be due to our recruitment pool of regional center clients, as all families came to a Los Angeles County regional center before their daughter was 3-years-old. Overarching themes included barriers and facilitators at multiple levels (individual, family, community, systems). The Spanish-language families faced some barriers that the other families did not: Language barriers resulted in confusion about services, and some reported that a documented autism diagnosis did not qualify their daughter for school services. The Spanish-language families generally identified first signs and received a diagnosis a few months later than the English-language families; but for all families, culture and extended family played an important role in how caregivers came to identify early signs and report them to a healthcare provider, and how families came to understand their autistic daughter.

Conclusions: These qualitative findings elucidate the experiences of diverse families of autistic girls with regards to the autism ‘diagnostic odyssey’ in Los Angeles County. They serve as a starting point for addressing autism disparities and improving care for these underserved groups.

221.003 (Panel Discussion) Characterizing Autism Stigma in the Latine Community: Impacts and Implications

M. M. Abdul-Chani, Y. Morales, A. Jaimes Rice, S. E. O’Kelley and K. Zuckerman; (1)Psychology, The University of Alabama at Birmingham, Birmingham, AL, (2)Pediatrics, Div of General Pediatrics, Oregon Health & Science University, Portland, OR, (3)University of Alabama at Birmingham, Birmingham, AL, (4)The University of Alabama at Birmingham, Birmingham, AL, (5)Division of General Pediatrics, Oregon Health & Science University, Portland, OR

Background: Significant disparities in autism diagnosis and treatment exist for Latine families with limited English proficiency in the U.S. Stigma is one of the most understudied barriers to autism care and varies across cultures. The Latine culture is considered collectivist, meaning it places high value on community perception and inclusion. As a result, social support for families of individuals with autism may vary because of the dual emphasis on helping one’s community but maintaining community norms and fitting in. No study has explored autism stigma as perpetuated by the Latine community, and its effect on families of individuals with autism.
Objectives: Explore the Latine community's beliefs about autism, attitudes towards autism, and potential effects of stigma on Latine individuals with autism and their families.

Methods: Twelve Latine parents of typically-developing children were recruited from a pediatrics clinic in Portland, Oregon. Parents completed an in-depth qualitative interview and demographics questionnaire in Spanish or English, depending on preference. Using a phenomenological approach, a coding framework was developed, and structural coding established a set of predetermined codes that characterized the data generally. An emergent coding approach was used to create new codes exploring each predetermined global characterization more precisely. Coding frameworks were reviewed by stakeholders (i.e., parent and provider) for triangulation. Interviews and coding ceased when thematic saturation was achieved.

Results: Qualitative analysis revealed several major themes and a connection between these themes. Participants endorsed a lack of resources about autism leading to a lack of knowledge and awareness of autism in the Latine public. This lack of knowledge and awareness resulted in misinformation and uncertainty (e.g., beliefs that autism was caused by vaccinations, blaming parenting). Participants described a link between the misinformation and uncertainty, stating that this led to people causing harm (i.e., “saying the wrong thing”) to families of individuals with autism. Consequently, a fear of causing harm was reported, which ultimately led to hesitation or resistance to help out of fear that the “help” would actually “harm.” Despite this, all participants reported a desire — rooted in their culture — to learn more in order to be able to provide assistance to the families in need. Other major themes included comparisons and conceptualizations of autism within a perspective rooted in limited information.

Conclusions: Previous research in autism stigma suggests several possibilities: 1.) stigma is not as high as perceived by parents of children with autism, 2.) those perpetuating stigma are not reporting it explicitly on quantitative measures, and/or 3.) those perpetuating stigma are not aware that these attitudes are stigmatizing. The current study provides evidence for the third possibility. Participants acknowledged potential damage that is caused by a lack of knowledge without explicitly stating these views are stigmatizing. Moreover, participants recognized the negative impact of these attitudes on providing social support. Results from the present study provide avenues for future research such as utilizing collectivistic culture in linguistically- and culturally-sensitive ways to spread knowledge of autism, provide social support for families, and increase inclusivity.

221.004 (Panel Discussion) The Autism ‘Diagnostic Odyssey’ in the Greater Accra Region of Ghana: Using Participatory Research to Identify Barriers and Facilitators to Obtaining an Autism Diagnosis and Services

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Background: Despite the increasing global prevalence of autism spectrum disorders, there is limited information about the prevalence of autism in Africa. Existing research on autism in Africa shows that autistic children are diagnosed relatively late, or not at all, compared to autistic children from higher-income countries. This may be attributed to delays and challenges that are unique to this context.

Objectives: The purpose of this study was to understand the barriers to the autism ‘diagnostic odyssey’ in the Greater Accra Region of Ghana, and to engage key stakeholders to action plan steps to reduce the barriers.

Methods: We conducted a participatory study using semi-structured qualitative interviews, photo elicitation, and focus groups with 11 participants (4 parents and 7 health professionals) from public and private healthcare settings in the Greater Accra region. A key informant (second author), a neurodiversity advocate who heads a neuro-developmental clinic in a large hospital, engaged with recruitment and data collection. For the interview transcripts and focus group notes, we coded using NVivo. We followed Braun and Clarke’s (2006) thematic analysis, specifically utilizing 1) theoretical (guided by a-priori theoretical framework), 2) semantic (focusing on surface-level meanings), and 3) essentialist (theorizing meaning in a straightforward way) approaches. All transcripts were coded by at least two coders; we discussed and resolved all differences. The themes were presented to the key informant for member checking; and to the stakeholders during a final focus group, where we used nominal group technique to identify and prioritize major problems and possible solutions for improving early and accurate autism diagnosis in this community.

Results: Neuro-pediatricians reported that it takes 2 to 6 visits over 2 weeks to 2+ years to diagnose a child. Our thematic qualitative analysis yielded three overarching themes, with barriers and facilitators for each: 1) Systemic, 2) Community, and 3) Parent/Family factors that influence the diagnostic process. However, the action plan of our stakeholder focus group prioritized not increasing diagnosis rates, particularly because a diagnosis does not currently lead to publicly available services. Rather, the stakeholders emphasized that first, community education is critical to dispel myths and encourage autism acceptance within the Ghanaian community, making the context more accommodating to autistic children and their families.

Conclusions: Knowledge about the diagnostic odyssey can help facilitate early autism diagnosis in Ghanaian contexts. Importantly, however, the community did not prioritize increasing diagnosis rates until there was more culturally sensitive, strengths-based knowledge and education about autism.
Background: Although most children with developmental disabilities live in Low-Middle Income Countries (Olusanya et al., 2018), few have access to care. The World Health Organization (WHO) developed the Caregiver Skills Training (CST) programme to address this unmet need by equipping parents with skills to promote social communication, learning, and behaviour management in children with developmental disabilities (WHO, 2022; Salomone et al., 2019). Acknowledging the importance of culturally-informed intervention adaptations, the WHO recommends adapting the intervention to increase feasibility, acceptability, and potential impact (Szlambka et al., 2022). The WHO CST programme has undergone field trials in over 30 countries. The programme comprises nine group sessions and three individual home visits and is fully manualised, comprising participant booklets and facilitator guides. In separate studies, the programme was previously contextually adapted and pilot-tested in Ethiopia (Tekola et al., 2020) and Kenya. However, there is limited understanding of how intervention adaptations made for one context can inform the adaptation and implementation in others, and how to harmonise adaptations in cross-cultural investigations.

Objectives:

- To outline the process of adapting and harmonising previous Kenyan and Ethiopian adaptations of the WHO Caregiver Skills Training programme for use in a cross-cultural randomised controlled trial (RCT) being implemented in rural and urban contexts in Ethiopia and Kenya.
- To highlight key lessons learned in the adaptation and harmonisation process.

Methods:

We used a stepwise approach (Movsisyan et al., 2019) to further adapt and harmonise the WHO CST training materials for use in the multi-country RCT. We:

1. Outlined and compared differences between adaptation approaches and final adaptations of materials used in the previous pilots.
2. Engaged in cross-site harmonisation meetings with researchers, CST master trainers and non-specialistic facilitators, clinicians, and WHO staff to discuss noted differences and agree on a harmonised approach across contexts. The decision-making strategy adopted is presented in Table 1.
3. Analysed differences between the harmonised materials and the newly revised WHO materials to select critical revisions based on limitations noted during the country-specific pilot studies.

Results: We made content and procedural adaptations to the CST training materials, without changing the core components of the WHO intervention programme. Content adaptations included the addition of a discussion on physical punishment based on the high prevalence of the practice in both countries and its negative impact on children. Procedural adaptations included re-introducing writing components of the intervention into the Ethiopian context using implementation strategies from the Kenyan context. Some context-specific adaptations were retained. For example, the practice of calling to remind participants was deemed critical to ensuring attendance in Kenya but not in Ethiopia, where attendance without reminders was near 100% in the pilot. Finally, the team adopted, across both countries, revisions recommended by the WHO team, e.g. changes to the order of training content and the inclusion of more diverse illustrations.
Conclusions:

This proposal outlines a stepwise process by which culturally-specific adaptations can be applied cross-culturally while incorporating critical revisions. The findings and study approach may inform future efforts to adapt and implement interventions across contexts.

305.002 (Oral) Socioeconomic Status, Mental Health and Cognitive Outcomes in Autism: The Effect of Family Composition and Income across Three Multi-Country Studies


Background: Despite much research on socioeconomic status (SES) from global health perspectives, surprisingly little has focused on autistic individuals. As this gap is integral to address the cognitive and mental health vulnerability of the vast majority of autistic people living in middle-to-low income settings (Lord, Charman, Havdal et al., 2022), recent studies have finally started to pursue this direction (Carter Leno, Wright, Pickles et al., 2022; de Leeuw, Happé & Hoekstra, 2020).

Objectives: This project aims to expand insights of SES, mental health and cognitive outcomes in autism with globally representative data across Europe, South Africa and South Asia. In the Longitudinal European Autism Project (LEAP) and South African Safe Passage (SP), common variables of SES, autistic traits and mental health were collected, and therefore used to investigate their relationship across settings. In the Indian Eye-Tracking Assessment for Children with Autism (EIRA), diagnostic status, income range and cognitive outcomes of children whose access to diagnostic service may be influenced by SES was collected, and therefore investigated.

Methods: 764 participants contributed to LEAP (311 autistic; 230 females; age range 6-30 years), 100 to SP (non-autistic, screened for autism; 50 females; age range 6-11 years), 124 to EIRA (46 autistic; 41 females; age range 3-5 years). Multiple linear regression investigated the effect of factor scores of parental employment and education, home and family characteristics on internalising and externalising scores as measured with the Strength and Difficulties Questionnaire (SDQ), in interaction with autistic traits (LEAP, SP). Income range as an instrumental variable was used in two-stage least-square regression, predicting cognitive standardised scores (as measured with the Developmental-Profile 3, DP-3) and autism diagnosis (EIRA).

Results: LEAP and SP cohorts showed similar 4-factor structures (Child Characteristics, Family System, Parental, Material Resources; Fig. 1). “Family System” captured family size and maternal factors and was associated with SDQ change (LEAP: Coef. = -2.54, SE = 1.02, p-value = 0.01; SP: Coef. = 25.53, SE = 11.32, p-value = 0.03). High autistic traits reduced these effects (LEAP: Coef. = 0.03, SE = 0.01, p-value = 0.01; SP: Coef. = -1.58, SE = 0.71, p-value = 0.03).

For EIRA, income influenced the cognitive outcome via changing the likelihood of diagnosis, as shown by a significant and negative instrumental effect of income (Coef. = -31.80, SE = 7.40, p-value < 0.001). However, this negative effect became non-significant for the second highest income range (Coef. < 0.001), and positive for the highest range (Coef. = 40.67).

Conclusions: The composition of the family significantly relates to mental health, with a distinct association with autistic traits and setting, suggesting that size and complexity of support networks affect mental health of autistic people. Income level influenced cognitive outcome by means of changing the likelihood of diagnosis, although positive effect on cognition was only significant for the highest income. These insights form a complex picture, with SES across settings affecting the life of autistic people from diagnosis up to mental health and cognitive outcomes; next steps should start informing how these domains influence each other.

305.003 (Oral) Adaptation of the Who Caregivers Skills Training Program. Implementation in Two Latin American Countries


Background: Despite much research on socioeconomic status (SES) from global health perspectives, surprisingly little has focused on autistic individuals. As this gap is integral to address the cognitive and mental health vulnerability of the vast majority of autistic people living in middle-to-low income settings (Lord, Charman, Havdal et al., 2022), recent studies have finally started to pursue this direction (Carter Leno, Wright, Pickles et al., 2022; de Leeuw, Happé & Hoekstra, 2020).

Objectives: This project aims to expand insights of SES, mental health and cognitive outcomes in autism with globally representative data across Europe, South Africa and South Asia. In the Longitudinal European Autism Project (LEAP) and South African Safe Passage (SP), common variables of SES, autistic traits and mental health were collected, and therefore used to investigate their relationship across settings. In the Indian Eye-Tracking Assessment for Children with Autism (EIRA), diagnostic status, income range and cognitive outcomes of children whose access to diagnostic service may be influenced by SES was collected, and therefore investigated.

Methods: 764 participants contributed to LEAP (311 autistic; 230 females; age range 6-30 years), 100 to SP (non-autistic, screened for autism; 50 females; age range 6-11 years), 124 to EIRA (46 autistic; 41 females; age range 3-5 years). Multiple linear regression investigated the effect of factor scores of parental employment and education, home and family characteristics on internalising and externalising scores as measured with the Strength and Difficulties Questionnaire (SDQ), in interaction with autistic traits (LEAP, SP). Income range as an instrumental variable was used in two-stage least-square regression, predicting cognitive standardised scores (as measured with the Developmental-Profile 3, DP-3) and autism diagnosis (EIRA).

Results: LEAP and SP cohorts showed similar 4-factor structures (Child Characteristics, Family System, Parental, Material Resources; Fig. 1). “Family System” captured family size and maternal factors and was associated with SDQ change (LEAP: Coef. = -2.54, SE = 1.02, p-value = 0.01; SP: Coef. = 25.53, SE = 11.32, p-value = 0.03). High autistic traits reduced these effects (LEAP: Coef. = 0.03, SE = 0.01, p-value = 0.01; SP: Coef. = -1.58, SE = 0.71, p-value = 0.03).

For EIRA, income influenced the cognitive outcome via changing the likelihood of diagnosis, as shown by a significant and negative instrumental effect of income (Coef. = -31.80, SE = 7.40, p-value < 0.001). However, this negative effect became non-significant for the second highest income range (Coef. < 0.001), and positive for the highest range (Coef. = 40.67).

Conclusions: The composition of the family significantly relates to mental health, with a distinct association with autistic traits and setting, suggesting that size and complexity of support networks affect mental health of autistic people. Income level influenced cognitive outcome by means of changing the likelihood of diagnosis, although positive effect on cognition was only significant for the highest income. These insights form a complex picture, with SES across settings affecting the life of autistic people from diagnosis up to mental health and cognitive outcomes; next steps should start informing how these domains influence each other.

Background: As the prevalence of autism spectrum disorder (ASD) increases (Zeidan et al., 2022), so have the global demands for ASD-targeted interventions and services through regional and local program implementation (Black et al., 2017; Tekola et al., 2020; Sengueta et al., 2021). Despite the promising results from the Parent Mediated Interventions (PMI) literature, most studies on the effectiveness of such interventions have been conducted in High-Income Countries, with limited evidence about their efficacy in Low and Middle-Income Countries (LMIC). Furthermore, the current implementation of PMI in LMIC is done with little knowledge or guidance on their quality, acceptability, feasibility, and scalability (Dababnah et al., 2018; Bordini et al., 2020).

Objectives: explore the perceptions of Argentinian and Uruguayan caregivers about the feasibility and acceptability of implementing the WHO-CST program in their countries and identify whether cultural adaptations are needed for its successful implementation in this global region.

Methods: The WHO-CST program was implemented in a school setting in Argentina and in a child psychiatry facility in Uruguay, and focus groups with participant caregivers (Argentina, n=8, and Uruguay, n=6) were completed after its implementation. The study used a phenomenological framework design to analyze the participants’ responses to post-implementation focus group questions and extract commonalities and differences in each country. Focus groups were audio-recorded and transcribed verbatim in their original language, and applied thematic analysis was used to analyze the data. In addition, more attention was given to themes related to feasibility, acceptability, and suggestions to improve the program delivery and content, following the method used by Salomone et al. (2021).

Results: The thematic analysis of the caregivers' responses identified four main themes across the two countries: 1) Expectations on the program, 2) Content, 3.) Benefits and Achievements, and 4) Challenges. In addition, suggestions to improve the program were included. According to caregivers, the CST program met their expectations. It gave them new tools, ways of interacting and dealing with their children, knowledge, new habits, such as pausing and reflecting, and the development of new skills, such as observation. Caregivers also mentioned how CST brought a service where it was not otherwise offered. Several adaptations were proposed to decrease barriers to accessing serving: having group sessions every other week instead of weekly, including other family members, use of videos for demonstrations, options for conducting home visits, follow-up sessions, and information on how to navigate the school system, among others.

Conclusions: Our findings support the feasibility and acceptability of implementing the WHO-CST program with caregivers of autistic children in Argentina and Uruguay. Suggestions included changing the delivery frequency, follow-up sessions, and different options for home visits to avoid caregivers' stress or the sense of intrusion. As in other low-resourced areas, the WHO-CST program in Argentina and Uruguay requires ongoing cultural and linguistic adaptations while being scaled up and implemented in community settings scaling up and implementing it in community settings. These adaptations help close the treatment gap by addressing barriers to accessing timely, evidence-based interventions.

ORAL SESSION — INTERNATIONAL AND CROSS-CULTURAL PERSPECTIVES

311 - Standardizing Measures Across Cultures

Moderator: Mirko Uljarevic, Department of Psychiatry and Behavioral Sciences, School of Medicine, University of Melbourne, Stanford, CA

311.001 (Oral) Cross-Cultural Differences in the Interpretation of Autistic Traits
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Background:

The diagnosis of Autism Spectrum Disorder relies partly on the judgment of social behaviour. What is perceived as normal or abnormal (social) behaviour is influenced by culture, as culture shapes norms and beliefs about behaviour. Culture might hence influence the interpretation of autistic symptoms and the diagnostic process.
Objectives:

We aimed to study whether culture affects the interpretation and reporting of autistic traits, and how autism knowledge is associated with this. To do so, we investigated cross-cultural differences in the perception of the Autism Spectrum Quotient’ (AQ) items in self-report and social/cultural-report levels across Iran, Malaysia, Morocco, and the Netherlands. Additionally, we explored the relationship between self-reported, social/cultural-reported autistic traits and autism knowledge across the four countries.

Methods:

We recruited non-autistic adults in Iran, Malaysia, Morocco, and the Netherlands (N = 476) and administered the AQ and the ‘Culture-AQ’, to study whether culture influenced the interpretation of AQ items. The ‘Culture-AQ’, was developed to measure autistic traits on a social/cultural level. The Culture-AQ enquires whether the behavioural traits as measured with the AQ are common in one’s cultural society. Additionally, we measured autism knowledge, to explore its association with the AQ and ‘Culture-AQ’ across the four countries.

Results:

There was a significant difference in AQ scores between the four countries, $F(3, 472) = 34.01, p < .001$. Post-hoc tests revealed that Iran, Malaysia, and Morocco scored significantly higher than the Netherlands. Moreover, there was a significant difference in Culture-AQ scores between the four countries; $F(3, 472) = 66.03, p < .001$. Post hoc tests revealed that Iran, Malaysia, and Morocco scored significantly higher than the Netherlands on the Culture-AQ scores. Additionally, there was a significant difference in autism knowledge between the four countries, $F(3, 383) = 29.68, p < .001$. Post hoc tests revealed that the Netherlands scored significantly higher than Iran, Malaysia, and Morocco. Finally, we investigated the association between the AQ, ‘Culture-AQ’, and autism knowledge across the four countries. There was no significant regression equation in Iran, while significant regression equations were found in Malaysia ($F(2, 93) = 9.03, p < .001$), with $R^2$ of .16; AQ = 158.998 - .598 (autism knowledge), Morocco ($F(2, 91) = 11.07, p < .001$, with $R^2$ of .20; AQ = 132.090 - .477 (autism knowledge)), and the Netherlands ($F(2, 106) = 6.190, p = .003$), with $R^2$ of .105. AQ = 98.139 + .224 (Culture-AQ).

Conclusions:

The results indicated, consistent with previous studies, cross-cultural differences in both self-reported and social/cultural-reported autistic traits. Cross-cultural differences in reporting autistic traits showed that cultural background might affect the interpretation of autistic traits. Therefore, it is crucial to consider cultural differences when using autism measurements or interventions. However, there was not a straightforward relationship between self-reported and social/cultural-reported autistic traits. Hence, if autistic traits are more common on a social/cultural level, people do not necessarily score themselves higher in autistic traits too. Besides perceiving certain autistic behaviour more common, knowledge about autism seems to influence self-reported autistic traits in some countries.

311.002 (Oral) Cross-Cultural Investigation of the Autism Stigma and Knowledge Questionnaire (ASK-Q) Psychometrics

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Background:

Given that global disparities stem in part from variability in autism knowledge and associated stigmas (Stahmer et al., 2019; Ruparelia et al., 2016; Durkin et al., 2015), quantifying regions in need of interventions to increase knowledge is an important public health priority. Unfortunately, efforts to systematically identify low autism knowledge regions have been slowed by measurement concerns in the field. The Autism Stigma and Knowledge Questionnaire (ASK-Q) was developed and validated to assess cross-cultural variability in autism knowledge (Harrison, Bradshaw et al., 2017; Harrison et al., 2019). However, with increased international use, the ASK-Q has demonstrated variable reliability in different countries following translation.

Objectives:

The current study aims to use a large, international sample to examine and refine the ASK-Q items to ensure the reliability across cultural contexts of the total score and four subscales: i) diagnosis/symptoms, ii) etiology, iii) treatment, iv) stigma. Recommendations will be made for item removal and refinement to create a more universally psychometrically sound measure.

Methods:

The psychometric examination of the ASK-Q used a subset of data from a large sample (n = 6830) from 13 different countries. The analyses included responses from countries with samples of 500 participants or more (i.e., United States, China, Netherlands, Romania, and
Background: Autism Spectrum Disorder (ASD) is a complex condition associated with significant impairments in social, communication, and behavioral functioning. Low- and middle-income countries face great disparities in access to best practice care, including standardized diagnostic assessments. Deficits were only exacerbated with the onset of COVID-19. During the pandemic, standard administration of the Autism Diagnostic Observation Schedule-Second Edition (ADOS-2) was not possible, as telehealth administration and use of personal protective equipment rendered the test invalid. Thus, the Brief Observation of Symptoms of Autism (BOSA) was developed by Dr. Catherine Lord and colleagues at the University of California at Los Angeles to address this gap. The BOSA was translated into Spanish, but no validation study of the Spanish language BOSA has been completed.

Objectives: Validate the use of the BOSA with a Latin-American population and, in turn, potentially improve access to appropriate diagnostic services in the region. In addition, the project sought to train professionals remotely in best-practice care and establish a multicenter network for diagnosis and referral.

Methods: The clinician-researchers that participated in the study were part of the Extension for Community Healthcare Outcomes (ECHO) Autism: PROTECTEA network. This network consists of professionals who work in primary care settings and hospitals that assess individuals with neurodevelopmental differences. Only those professionals who had prior training in the ADOS-2 and could show proof of certification were allowed to take part in the training and subsequent validation study (56 clinicians from 24 centers across Argentina and Chile). All clinicians completed the UCLA training on the BOSA, presented at least two BOSA cases during the ECHO BOSA supervision credit on the ASK-Q across cultures. The introduction of measures designed with cross-cultural validity in mind can facilitate cross-cultural comparisons without requiring measurement adaptation.

Conclusions:

This study acknowledges the importance of cross-cultural variability and uses a diverse sample to provide recommendations for improving the validity of the ASK-Q across cultures. The introduction of measures designed with cross-cultural validity in mind can facilitate cross-cultural comparisons without requiring measurement adaptation.

Results: A total of 313 cases (16 months to 49 years). Receiver operator characteristic (ROC) curves were run for each module based on the algorithm total, resulting in good discrimination between ASD and non-spectrum control groups. When comparing optimal cutoff scores for each module with the UCLA suggested cutoff scores, the LATAM ROC curves resulted in slight differences for modules 1 and 3, with greater differences with modules 2 and 4. The suggested cutoff for the Toddler Module T remained the same (See Table 1).

Conclusions: The ECHO Autism framework was used to train and supervise a network of clinicians during the pandemic to complete a validation study of the Spanish-language BOSA. Results of the Latin American sample were similar to those found by the UCLA group, with high levels of sensitivity and specificity. Findings suggest that it may be a good resource for populations with poor access to
specialists in their communities to reduce disparities and increase access to appropriate diagnosis.

311.004 (Oral) Cross-Cultural Adaptation of Measures of Childhood Functioning in Low- and Middle-Income Countries: A Process Description in a Northern Indian Context

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Background: Measures assessing childhood functioning are often developed in High income countries (HIC) with western cultures and need to be adapted for use within cultures in which constructs they measure might be irrelevant in their original form. Hence, cross-cultural adaptation is a robust and cost-effective solution which ensures measurement validity is maintained. This study describes the framework of cross-cultural adaptation of three measures, viz. Vineland Adaptive Behavior Scales-Third Edition (Vineland-3); Communication and Symbolic Behavior Scales-Developmental Profile (CSBS-DP) Caregiver Questionnaire and Child Health Utility-9D (CHU-9D), followed in the ‘Communication-centred Parent-mediated treatment for Autism Spectrum disorder in South Asia’ (COMPASS) Trial.

Objectives: The primary objective of the study was to adapt the three measures using a systematic framework while establishing semantic, idiomatic, conceptual, experiential, and technical equivalence between the original and adapted versions of the measures.

Methods: A stepwise process was followed for adaptation as is detailed in Figure 1. The various steps of the cultural adaptation process were carried out in rural Haryana and in the urban setting of the National Capital Territory (NCT) of Delhi in Northern India where most residents use Hindi language for communication.

(Insert Figure 1 here)

Results: Cross-cultural adaptation was done with the aim of achieving equivalence between source and target items. Equivalent meaning for each word in every item of the original measure from a culturally equivalent word or set of words in Hindi was found. The underlying construct that each item was trying to measure was retained. Contextual elaborations were also found for idioms used in the items. The adapted versions of the measures had grammar, punctuation, sentence structure, instructions, layout & format, and mode of administration as they were in the original measures.

Conclusions: Adaptation of measures is a rigorous process and involved various challenges. The adapted versions of the measures were best representative of the culture under study while they retained the required characteristics and the intent of the items of the original version. The systematic process described to achieve the same could act as a guiding framework for researchers who are new to this process.

POSTER SESSION — INTERNATIONAL AND CROSS-CULTURAL PERSPECTIVES

403 - International and Cross-Cultural Perspectives

403.170 (Poster) A Practical Guide to Reducing Bias in Autism Research
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Background: The past decades have seen dramatic increases in funding for autism research and in number of autism papers published. Researchers seeking to improve existing knowledge about autism must thus assess and interpret a vast, disparate, and rapidly growing literature. How well autism researchers evaluate this body of work, pose research questions based on it, and go on to design, conduct, and report their own research, all affect the progress of autism research and the wellbeing of autistic people. Biases may undermine research at any stage from its conception to its publication, and biases in published research risk being perpetuated and amplified by further research. Efforts to identify and reduce biases should thus be a priority across all stages of research.

Objectives: This investigation aims to review biases in autism research and to provide autism researchers with tools to acknowledge potential biases and practical recommendations to tend towards better research.
Methods: We performed an extensive literature search in the fields of cognitive science, psychology, and neuroscience. We focused on biases particularly relevant to autism research in the field of human cognition, although some of these considerations might be applied to other scientific domains or to other conditions. We have opted to present biases that individual researchers may be able to directly act on, as opposed to large systemic biases which would require much more complex interventions. We describe and categorize different types of bias and how they can affect the quality of autism research at different stages and propose recommendations on how to recognize and minimize these biases.

Results: The biases we identified were organized into three categories: i) conception and study design; ii) participant selection and recruitment; and iii) reporting results and publication. Each category calls for recommendations and discussion points. The main recommendations emerging in these three categories were to involve autistic people in research so that its topics are aligned with autistics’ needs, to design inclusive research protocols that allow for participation across the autism spectrum, and to be transparent in reporting results by acknowledging the biases than cannot be eliminated. Although the biases identified in this investigation are not all individually specific to autism, taken together they point to the challenges and specificity of autism research.

Conclusions: Although studies and commentaries have been published about biases in research, the impact of these biases specifically on the field of autism research has not been addressed. Here we propose a non-exhaustive list of biases and associated recommendations that altogether can help the reader increase the quality of their research. Increasing awareness to biases within the scientific community may contribute to the establishment of higher standards of quality in autism research and better ethical practices.

403.171 (Poster) A Qualitative Investigation on the Cross-Cultural Humility of Caregivers for Children with Autism in Nigeria and South Africa

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Background:

Culture may influence the perceived need for treatment, which treatments are viewed as acceptable, and treatment seeking behaviours in individuals with autism and their families. To effectively deliver services to and care for individuals with autism spectrum disorder (ASD; hereinafter autism) in multilingual and multicultural societies, including Nigeria and South Africa, an understanding of different cultures is critical for caregivers such as educators and health professionals. Nigeria for instance has Yoruba, Hausa, Igbo and other over 500 living languages, and diverse cultures such as those relating to health management, child's upbringing, belief system on disorders etc. Cross-cultural competence is commonly defined as an individual’s ability to relate and communicate effectively when the other individuals involved in the interaction do not share the same culture, ethnicity, and/or language. In Nigeria and South Africa, many children with autism have different linguistic and cultural backgrounds than their available caregivers. This dissonance can create scenarios in which caregivers—at times unknowingly—negate the cultural values and beliefs of individuals with autism and their families thereby delivering suboptimal care. No research has, however, examined the training and experiences related to cross-cultural competence among caregivers delivering services to children with autism in Nigeria and South Africa.

Objectives:

This study aimed to explore the professional training and experiences related to cross-cultural competence in caregivers for children with autism in Nigeria and South Africa. This study also investigated the implications of limited cross-cultural competence among these caregivers in their work with children with autism and their families.

Methods:

The study adopted a qualitative approach, and its protocol adhered to ethical considerations. Using purposive sampling, 15 caregivers were recruited from Lagos, 10 from Ibadan, and eight from Abuja in Nigeria. In South Africa, 12 caregivers were recruited from Johannesburg, six from Pretoria, and 10 from Durban. The primary eligibility criteria was that the caregivers needed to be currently delivering evidence based services to children with autism ages 18 months-12 years in Nigeria or South Africa. The data was collected using semi-structured interviews and analysed using thematic content analysis.

Results:

A total of 61 caregivers were interviewed and a majority of them (n = 47; 77%) had no professional training on cross-cultural competence. Many caregivers (n = 41; 67%) mentioned challenges addressing cross-cultural issues while providing services to individuals with autism. The caregivers (n=53; 87%) felt their limited cultural competence negatively affected the care rendered to individuals with autism. “It is difficult for many of us who are Yoruba to care for people with autism from northern, and eastern parts of Nigeria for instance, because we don’t understand their languages and many aspects of their cultures” (CGN12).
Conclusions:

Increased training on cross-cultural competence is essential for caregivers of individuals with autism in Nigeria and South Africa. The findings from many caregivers who participated in this study suggest that limited caregiver cross-cultural competence may adversely affect the effectiveness of services for individuals with autism in Nigeria and South Africa; hence, in-service training on cross-cultural competence is highly required.

403.172 (Poster) A Systematic Review of Global Public Knowledge and Attitudes of Autism

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Background:

Autism has attracted increasing attention in academia and in different communities around the world. Compared with professionals and clinicians, laypersons have fewer opportunities to receive formal academic knowledge of autism from professional training and research. The lack of public awareness and knowledge of accurate information about autism may result in stigma and misunderstanding.

Objectives:

This systematic review aims to synthesize the current state of laypersons’ knowledge and attitudes toward autism worldwide based on English-language research articles.

Methods:

Empirical studies published from 2013 to 2022 were identified by searching six electronic databases and a hand search of the reference list. The search criteria and strategies were presented in Figure 1. Totally 39 papers were included and analyzed via a narrative approach to synthesize the following themes.

Results:

(1) The main way for laypersons acquiring knowledge was social media, such as internet and TV. Other sources encompassed personal contacts and professional ways (< 26%). (2) Although most participants (> 70%) identified autism as a neurodevelopmental disorder in two studies, participants in the other eight studies believed autism as a communication disorder (around 50%), a brain disorder (around 60%) or a mental disorder (> 60%). (3) The public showed extremely varied understanding of the etiology, treatment, and prognosis expectations of autism, as evidenced by the wide ranges of the percentage of people across studies who endorsed these knowledge items either correctly or incorrectly: Autism is caused by genetic/neurological factors (<1% - 89%); by environmental factors (7% - 59%); by other mental disorders (2.3% - 63%); skills-based interventions are effective (8.1% - 83%); and adults with autism can "outgrow" autism (19% - 62.3%). (4) Most participants (around 80%) could identify the core features of autism based on DSM-5 (e.g., communication problems and repetitive behaviors). However, many also believed that autism is characterized by learning difficulties, illusion, deafness, and the inability to make friends. (5) Social economic status, educational attainment, and prior contact with someone with autism predicted more knowledge and positive attitudes, while the effect of gender and age were inconsistent. Country was also found to be a significant factor affecting knowledge and social attitudes in international studies (e.g., knowledge accuracy in the USA is higher than the UK, which is higher than China). 6) Despite that most participants (> 80%) showed a great willingness to be friends or neighbors with people with autism, more negative attitudes towards other types of social relationships with autism and implicit biases were prevalent among the public.

Conclusions:

Generally, the public had a high awareness of autism. Nevertheless, they hold more consistent knowledge of symptoms than etiology, treatments, and prognosis expectations. This inconsistency may imply ambiguous knowledge and further impact how the public form implicit attitudes and keep a distance from people with autism. More community training programs and advocacy initiatives explicitly targeting these areas are recommended. Mental health professionals and media groups should work together to promote more accurate knowledge and culturally sensitive understanding of autism to reduce misconceptions.

403.173 (Poster) A Systematic Review of Interventions to Teach Functional Skills to Autistic Children in LMIC Contexts

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Background: Research on effective interventions to teach a variety of functional skills to autistic children in LMIC contexts is scant. Overwhelming majority of autistic individuals live in LMIC settings, yet what we know about effective intervention strategies in teaching functional skills come from HICs.

Objectives: The purpose of this study was to systematically review the interventions used to teach functional skills to autistic children in LMICs and synthesize the evidence base in this area. The aims were to analyze the types of interventions used, the characteristics of interventions and studies that resulted in successful outcome for children, and demographic and geographic characteristics of these studies.

Methods: A systematic search of the literature using several electronic databases was conducted to identify relevant studies. A total of 708 studies were identified, and a total of 9 studies met the inclusion criteria. These studies were published between 2015 and 2021. They coded and synthesized studies for the participant and interventionist characteristics, including race/ethnicity/culture, LMIC context as defined by World Bank, types of interVENTions and trainings used, participant learning outcomes and methodological rigour.

Results: Overwhelming majority of intervention studies to teach functional skills to autistic children in LMICs were conducted in Turkey, followed by Sri Lanka, India, Pakistan, and Syria. Studies focused on a variety of functional skills and used various quantitative methodologies (RCT, single-case experimental design, mixed-methods design). Autistic children in these studies ranged from 18 months old to 9 years old. Seven of the studies had strong or adequate ratings on methodological rigour with two studies having weak ratings.

Conclusions: Intervention studies that address functional skills instruction for autistic children in LMICs are scarce and loosely spread across geographic regions. All included studies focused on young children. Addressing the needs of autistic children, adolescents, and young adults and teaching them functional skills to foster independent functioning in the society is critical. Future research efforts should aim to examine the adaptation and feasibility of evidence-based practice in different LMICs.

403.174 (Poster) An Ecocultural Exploration of Play in Children with Developmental Disabilities from Resource-Limited Communities: Perspectives of South African Caregivers

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Background: Children’s play is a universal concept and easily apparent to even the most casual observer but remains a natural and culturally embedded phenomenon – one through which children explore and make sense of their world, societal norms, and cultural expectations. While there is research available on the play of children with and without developmental disabilities, there is minimal research on the play of children with developmental disabilities living in culturally diverse, resource-limited settings. Contextualised research on children’s play in their natural environments and the toys and materials they play with is essential when developing and implementing early intervention programmes. A deeper understanding of play and play materials is even more critical when (a) developing and implementing interventions for children at risk of developmental delays or disabilities living in resource-limited communities and (b) using interventions that include play and play materials in their approaches.

Objectives: This study explored the play of Basotho children with developmental disabilities living in resource-limited communities in South Africa from their caregivers’ perspective. First, we explored the toys and play materials that these children can access (i.e., what they play with), and secondly, we delved deeper to understand why they play, how they play, and where they play. We specifically included the toys and play materials suggested by the World Health Organization Caregiver Skills Training (WHO CST) programme to explore the availability of their recommended items.

Methods: We used an exploratory and descriptive qualitative design with a social constructivist orientation. Twelve Basotho caregivers of children with developmental disabilities (including children with autism) were purposively selected to participate in two focus groups, which resulted in deep and rich conversations. Data were analysed through a hybrid process of thematic analysis, and results yielded themes incorporating ecocultural considerations of what, why, how, and where children play.

Results: Children do have access to a variety of play materials. Still, to have a deeper ecocultural understanding of their access, it is essential to consider (1) availability, (2) affordability, (3) accessibility, (4) acceptability, and (5) accommodation. Caregivers gave unique insights into why their children play (sensory stimulation, emotional regulation, and development), how their children play (the visibility of their disability, specific interests, and play partners), and where they play (mostly at their home).

Conclusions: As early interventions for children with developmental disabilities continue to gain global attention, it remains essential to consider the ecocultural contexts of children and their families. Understanding why, how, where, and with what children with developmental disabilities living in resource-limited communities play is not only imperative for the feasibility of interventions; it is of paramount importance in order to be respectful and culturally sensitive to the conditions and views of the communities where such programmes are implemented.
Figure 1. Five balloons represent the interconnected domains that determine the access that children with developmental disabilities have to toys and play materials.

Figure 2. The “Box Toy” represents the ecocultural considerations when exploring the play of Basotho children with developmental disabilities living in resource-limited communities.

403.175 (Poster) An International Evaluation of the Brick-By-Brick Programme in Kenya and Mexico
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Background:

There is growing interest in the application of play-based interventions to support autistic children’s social development. The Brick-by-Brick programme is an advancement on LEGO-based therapy, and brings children together in small groups to build LEGO® models playfully facilitated by a trained adult to promote collaboration and inclusion. The sessions are known as Brick Clubs to children. Previous research has found that Brick Clubs can support social awareness, the initiation of social interactions, sharing and turn-taking, negotiation, all while children develop confidence, self-esteem, and have fun, and build friendships.

Objectives:

Evidence to date has only been gathered in high-income, and mostly Western, contexts. The current study will evaluate the Brick-by-Brick programme, and test feasibility, acceptability, and child outcomes, in two LMIC countries: Kenya and Mexico.

Methods:

In each country, 2-3 facilitators are trained to run Brick Clubs, and two Brick Clubs will run (with 3-4 primary-aged autistic children each, total n = 16). Feasibility and acceptability of the training and the programme will be assessed using bespoke surveys and interviews with the facilitators and children’s families. Fidelity will be captured using direct observation and a bespoke measurement tool specific to the Brick-by-Brick programme, and children will provide direct qualitative feedback through interviews with the research team.

Results:

Data collected so far, through facilitator training and interviews across both countries, has shown that the Brick-by-Brick programme is feasible and acceptable in both sites. Suggested cultural adaptations include increased diversity and representation in training materials and worked examples of playful facilitation, and ways to recruit and engage with families across different contexts and geographies. Facilitators predict that the programme will have a positive impact on autistic children, and contribute to social connectedness, friendships, and children’s wellbeing and development. Children in both contexts have shared that Brick Club is a fun and engaging programme to develop social skills.

Conclusions:

The Brick-by-Brick programme is feasible, acceptable, and effective across different settings and cultures, according to autistic young people, their families, and facilitators.

403.176 (Poster) An Intersectional Lens of Black Parents’ Experiences of Autism
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Background:

This research examined Black parents’ lived experience of the autism spectrum disorder (hereafter autism) in the UK, to address the intersectional factors that influence their psychological wellbeing. Unlike predominant research on autism, the focus is exclusively on Black (African/Afro-Caribbean) parents’ experiences because of the dearth of research on this topic. It posits that a multifaceted lens is necessary to understand minoritized groups, value their experiences and provide relevant support at individual, contextual and systemic levels. This study recognises that parents’ experiences are not fixed but ever changing and offers new interpretation of different contexts. Thus, begins to bridge the gap in knowledge and awareness of Black parents’ experiences and the intersectional factors that shape their experiences.
Objectives:

- Describe and explain how intersectionality as a framework exposits the individual factors and familial settings that shape Black parents’ perceptions and experiences of autism in the UK
- Describe the different contextual and systemic factors that influence Black parents’ lived experiences of autism
- Determine ways that contextual factors shape parents’ wellbeing
- Synthesise the intersectional factors that shape parents’ experience of autism

Methods:

A qualitative approach was adopted using in-depth interviews with participants (N=15) across England and a hermeneutic phenomenological method provided breadth and depth of findings on experiences from an often-marginalised group of people at the intersection of race, gender and disability.

Results:

An intersectional lens provided insight of how multiple identities converge in various contexts. The findings revealed that in addition to challenges associated with autism, Black parents experienced distinct and nuanced difficulties associated with race, culture, gender and socio-economic status. Parents’ multiple and intersecting identities shaped their experiences of autism and their psychological wellbeing in the face of racism, unequal division of labour and oppressions from structural barriers in the home, community and organisations in wider society.

The findings of the study showed that mothers’ primary caregiving role negatively affect their quality of life (isolation, financial hardship) and psychological wellbeing. Culture influenced gender roles and perception of autism, which impacted the family structure and subsystems. However, mothers recounted the valuable nature of their coping strategies including spiritual beliefs, cognitive appraisal and resilience.

Conclusions:

This study revealed the multi-level intersection of race, culture, gender and disability and provides relevant information for mental health and social practice, policy, and research. The findings from this study have implications for Black parents’ mental health and wellbeing, especially as seen through the lens of cultural/religious factors and contributes to debates about individual wellbeing within a broader social milieu.

403.177 (Poster) Assessing Autism Knowledge across the Global Landscape Using the ASK-Q


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Background:

Global disparities are related to the variability of knowledge about developmental disabilities, including autism (Stahmer et al., 2019; Ruparelia et al., 2016; Durkin et al., 2015) and the stigmas that accompany lower levels of autism knowledge. Low autism knowledge has been specifically identified in many low and middle income countries (Low et al., 2021; Handayani & Paramita 2020; Alyami, 2022; Bakare et al., 2022), but it is difficult to know how concerning these knowledge levels are without direct comparisons to other regions and it is difficult to know what population variables likely contribute to knowledge deficits. The autism stigma and knowledge questionnaire (ASK-Q; Harrison, Bradshaw et al., 2017) was developed as a cross-culturally sensitive, comprehensive assessment tool to measure the nature and extent of ASD knowledge across different groups and countries.

Objectives:

The current study uses the ASK-Q to quantify autism knowledge across different countries and demographics. First, we investigated differences across individual countries and then in terms of groupings by worldview and income. Second, we examined differences in autism knowledge between the different populations in relation to autism that comprised the samples. Third, we examined how different sociodemographic factors related to autism knowledge.
Methods:

The current study compiled data from 6830 participants collected using adapted versions of the ASK-Q administered in 13 different countries, representing four different continents. Data was recoded to develop common sociodemographic metrics. Gross domestic product (GDP) and the Hofstede Model were used to designate countries as high and low income, and collectivist and individualist, respectively.

Results:

Structural equation modeling was used to examine how autism knowledge varied across country and individual factors. Results revealed cross country variability with a large, 17-point difference between the countries with the highest knowledge (Canada) and the lowest knowledge (Lebanon). Post hoc analyses revealed a meaningful stepwise pattern of significant differences for most countries (see figure 1). Countries either with higher economies or an individualistic worldview had higher levels of knowledge (both \( p < .001 \)). We also documented sociodemographic differences. Teachers and health professionals (both \( p < .001 \)) had significantly less knowledge than family members of autistic persons or the lay public (both \( p < .001 \)). Additionally, women had more autism knowledge than men (\( p < .0001 \)), and more education was significantly related to more autism knowledge (\( p < .0001 \)). Finally, our SEM model revealed that middle aged, elderly and young adults all had comparable autism knowledge after controlling for country and study population, but that older adults (\( p = 0.006 \)) and college age students (\( p < 0.001 \)) had significantly lower knowledge.

Conclusions:

These results help identify specific regions and populations that might most need greater information about autism. This study provides information that is important to policy makers in formulating strategies and interventions to raise awareness of autism by targeting those groups who demonstrate the most meaningful deficits. Heightened public awareness among caregivers, teachers and other service providers, health care professionals is crucial for early diagnosis of autism as it leads to prompt treatment initiation and better outcomes.

403.178 (Poster) Translation and Cultural Adaptation of the Abas-3 in the Brazilian Context: A New Tool to Evaluate Adaptive Functioning in Children with ASD in Brazil

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Background: In low- and middle-income countries there is a lack of screening tools to verify adaptive functioning in individuals with autism spectrum disorders (ASD). Adaptive functioning refers to a set of conceptual, social, and practical skills that are learned and performed to meet the demands of everyday life. In ASD, the assessment of adaptive behavior helps to specify the level of severity of the disorder. Assessing the adaptive functioning of individuals with ASD helps design intervention programs. An important instrument to assess adaptive functioning is the Adaptive Behavior Assessment System (ABAS-3). This instrument has different forms for use with children, adolescents, adults and the elderly. When translating an instrument, the idiomatic, linguistic, cultural, and contextual aspects related to its adaptation must be considered to demonstrate the semantic equivalence of the items in terms of the psychometric evidence of the adapted version.

Objectives: This study aimed to describe the process of translation and cultural adaptation of the ABAS-3 in the Brazilian context, as well as verify evidence of validity content.

Methods: This is a cross-sectional quantitative study. The study adopted the translation, cultural adaptation procedures based on 33 judges' criteria and evaluation by the target population (2 parents and 2 teachers), to facilitate the informants understanding. Instrument: ABAS-3 has five forms according to age, and the number of items and the skills area included. The forms of ABAS-3 for population between 0 and 21 years old are Parents/Primary Caregiver Form (0-5 years); Parent Form (5-21 years); Nursery/School Teacher Form (2-5 years); Teacher Form (2-5 years) and Adult Form (16-89 years).

Results: After the synthesis of the translations, the results of the evaluation by the committee of 33 experts showed that of the 1121 items of the five ABAS-3 forms, 82 (7.31%) needed revision. The criterion with the largest number of items for review was grammar/phrasing (48 items) and general criteria (45 items). Only three items showed a lack of agreement between the 33 experts in the item format criterion. Regarding the scales, the one that required the greatest revision of the items was health and safety (16 items), followed by the motor scale (14 items) and self-regulation (12 items). The leisure scale showed 100% agreement by the experts for all criteria, without any revision being necessary. The analysis of the items by target population showed no changes to the Parents/Primary Caregiver Form (0-5 years) and the Parents Form (5-21 years). The suggestions of the target population in the Teacher Form of the daycare/school (2-5 years old) resulted in two items being partially modified (Communication - item 18; Self-care - item 20) and in the Teacher Form (5-21 years old) one item was partially modified (Health and Safety – item 6).
Conclusions: This process resulted in good evidence of instrument content validity. After carrying out all the adaptation stages and establishing evidence of content validity, the instrument is ready to be used in future studies that investigate its accuracy and other types of validity evidence such as internal and external validity.

403.179 (Poster) Autism Research Conducted in Central Asia: Knowledge Gaps and Research Priorities
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Background: Ninety-five percent of children with neurodevelopmental disabilities younger than 5 years old live in LMICs. Scarcity of autism research in LMICs – including countries located in Central Asia – present major obstacles in providing education, healthcare, and social services to autistic people.

Objectives: The purpose of this scoping review was to review and examine the scope and focus of the published peer-reviewed research studies in order to understand the extent of the published autism research that originated in five Central Asian countries – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. We examined: (a) topics and research areas represented in autism research in each country, (b) research designs of conducted studies, and (c) the rate, trajectory, and geographic representation of autism research conducted in the region. The study also aimed at analyzing knowledge gaps and research needs to guide future research in autism in the Central Asian region.

Methods: A systematic search of literature through electronic databases and hand searches (Academic Search Premier/Ultimate, ERIC], CINAHL, APA PsycINFO, and MEDLINE, and Web of Science) yielded 11 peer-reviewed research articles published between 2013–2021 that met the inclusion criteria for the study. We extracted data according to the three areas of analysis described in the objectives and analyzed the topics and research areas of the studies according to the IACC Strategic Plan.

Results: Eleven studies used a variety of research methods (qualitative, quantitative, and mixed-methods). There was a total of 878 participants with 66 of them being parents. Eleven studies were published during the years of 2013–2021 with only one study published in 2013 and 10 studies published between 2019 and 2021. Nine articles were published in English and two in Russian. Ten studies took place with participants in Kazakhstan and one in Uzbekistan. There was an increase in autism research publications in Kazakhstan over time – from 2013 to 2021. When analyzing the topics and research areas of the studies, four studies were identified to be in the area of Services, two in the area of Risk Factors, two in the Treatments and Interventions category, one in Biology, one in Diagnosis, and one study both in Biology and Treatments and Interventions categories. There were no studies investigating lifespan issues; similarly, none of the included articles reported findings in the area of infrastructure and surveillance. None of the studies reported co-authorship of scientists from various Central Asian countries.

Conclusions: The findings of our study show that the overwhelming majority of the included studies were conducted in Kazakhstan with only one study – in Uzbekistan. There were no studies from Kyrgyzstan, Tajikistan, and Turkmenistan that met the inclusion criteria for our study. The absence of studies investigating lifespan issues, infrastructure and surveillance highlights a gap in research. Scarcity of autism research in the region and lack of collaboration among Central Asian scholars is concerning. These findings can be the first step towards identifying future research areas in Central Asia to meet the needs of autistic people.

403.180 (Poster) Autism and Indigenous Peoples in Canada: A Scoping Review and Local Service Access Study
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Background: Indigenous leaders have identified supporting the well-being of autistic individuals and their families as a growing concern in First Nations communities across British Columbia. Decades of research have demonstrated that access to timely and appropriate evidence-based diagnostic and support services are essential to autistic well-being. Yet, Black, Indigenous, and People of Colour (BIPOC) are diagnosed with autism later, report lower satisfaction and greater difficulty accessing services, and remain underrepresented in autism research compared to their white counterparts. Research on the unique experience and impact of autism in Indigenous communities is critical step towards achieving equity in autism services.

Objectives: N/A

Methods: In study 1, a scoping review of the peer-reviewed and grey literature was conducted to identify what information has been published to date on autism among Indigenous peoples in Canada. The review elucidated key gaps in current knowledge, and priorities for future research. Included publications were analyzed for the type of research, stated objectives, methodologies, and level of engagement with Indigenous communities. In study 2, descriptive analyses of data provided by British Columbia’s Ministry of Child and Family Development examined differences in proportional and timely access to autism funding programs between Indigenous and non-Indigenous children aged 0-18. Study 2 also analyzed and depicted the dispersion of registered autism service professionals (RASP) across BC in geographic relation to Indigenous
Background: Over the past two decades, there have been increasing discussions around which terms should be used to talk about autism. Whilst these discussions have largely revolved around the suitability of identity-first language (e.g., autistic person) and person-first language (e.g., person with autism), more recently this debate has broadened to encompass other autism-related terminology (e.g., “high-functioning”). To date, academic studies have not investigated the language preferences of autistic individuals outside of the UK or Australia, nor have they compared levels of endorsement across countries.

Objectives: The current study adopted a mixed-methods approach, employing both quantitative and qualitative techniques. The main objectives were to explore the linguistic preferences of English-speaking autistic adults across the globe and to qualify these with thematic analysis of detailed free-text responses.

Methods: Autistic adults (18 years or older) were recruited via an international autism research database (part of the U21 Autism Research Network collaboration), social media advertising, and through emails to autism charities and organizations across the globe. In total, 654 English-speaking autistic adults (128 self-identified) participated in this online survey from 30 different countries (M_age=31.90). They were asked to identify, by selecting from a list, which terms they endorsed being used against 6 terminology categories. These included (1) nomenclature (e.g., Autism, Autism Spectrum Disorder, Autism Spectrum Condition), (2) referring to the person (e.g., Autistic, Autistic person, Person with autism), (3) describing someone’s autistic identity (e.g., Has autism, Is autistic), (4) talking about autism more broadly (e.g., Condition, Disability, Neurological Difference), (5) talking about abilities or challenges (e.g., Deficits, Differences) and (6) talking about people without an autism diagnosis (e.g., Healthy controls, Neurotypical people, Non-autistic people). Finally, in a free-text response question, participants were asked to tell us more about their language preferences.

Results: Quantitative endorsement comparisons were made between countries where there was a minimum of 50 participants, including Australia, Canada, Ireland, New Zealand, UK and USA. Despite some variation in levels of endorsement between countries, we found that the most popular terms were similar- the terms “Autism”, “Autistic person”, “Is autistic”, “Neurological/Brain Difference”, “Differences”, “Challenges”, “Difficulties” and “Neurotypical people” were consistently favored across countries (see Figure 1). Thematic analysis of 414 free-text responses revealed the reasons underlying participants’ preferences, generating six core themes (see Figure 2); Problems of differentiation; We are different, not less; Autism is me; Claiming language and community; Be concise, be accurate, be specific; and Respect and hear our voices.

Conclusions: Despite relative consensus across countries to use identity-first, non-deficit-based language, both our quantitative and qualitative data demonstrate that there is no universally accepted way to talk about autism. These findings have significant implications for informing practice, research and language policy worldwide and our qualitative findings illuminated an important guiding principle: to respect people’s personal preferences.

403.181 (Poster) Autism-Related Language Preferences of English-Speaking Individuals across the Globe: A Mixed Methods Investigation

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403.182 (Poster) CST: Caregiver Skills Training Mediated Intervention in Adverse Contexts.

CST is an intervention program mediated by Caregivers of children with developmental delays or disorders, including autism, developed by the WHO and Autism Speaks. The program has proven efficacy and has been found to be beneficial in underserved populations, given the difficulties in access to support, lack or modest economic resources, or due to distance. Families with children between 2-7 years of age are included, and no specific diagnosis of autism was required.

Objectives: To explore the program’s feasibility to increase communication, management of disruptive behavior, promoting autonomy, and heighten coping skills from parents. The intervention aimed at supporting parent-child interactions. It also contributed to the formation of networks and better integration of families into their communities.

Methods:

The format included 8 weekly group meetings plus 3 individual sessions in a virtual format through ECHO AUTISM PROTECTEA Model. Caregivers received booklets with the essential contents. Topics were presented and explained during training sessions. In addition, the caregivers received booklets with the essential contents covered and illustrated stories that served as an identification models. Reflective discussions were generated. Personal goal-setting were included. An assessment was carried out before and 12 weeks after completing the workshop sessions. Caregivers completed a pretest and a posttest survey regarding their feelings towards different skills taught through the course. Quantitative assessment is reported elsewhere.

Participants: 164 families of children from March 2021 to June 2022. They were derived from early childhood Daycare Centers and Primary Care Health Centers in vulnerable areas from the City of Buenos Aires, or other 5 cities (Burzaco, Tres de Febrero, Mercedes, Mar del Plata and Santa Fe, Argentina). Inclusion criteria were failure in communication and social individual areas detected by screening with the Ages and Stages Questionnaire 3rd Version (ASQ-3).

Results:

Ninety percent of families completed the intervention. All these families were currently without any treatment due to the COVID-19 pandemic. Caregivers reported improvement in their skills to engage their child to participate in a back-and-forth game from 28.5% to 59.2% after the workshop. They also could increase their abilities to create opportunities for their child to communicate from 55.9% to 75.7% when the course was completed. They also could manage challenging behaviors from 43.5% to 61.1%. Children could increase autonomy from 31.9% to 67% after completing CST Course. Families reported that training fulfilled their expectations at 87%. They observed that 9 of 10 children improved their behavior and around 90% of parents could enhance their abilities as caregivers and achieved favorable changes in their everyday life.

Conclusions: CST intervention demonstrated very positive results in overall parent self-efficacy and family functioning. Parents felt empowered and knowledgeable on how to stimulate the development of their children and reported great improvements in their child’s communication, engagement, and behavior. The virtual modality increased adherence to treatment. CST showed continued success as a tool to enhance parent skills. As a team, it was gratifying to observe families move through the process and provide tools to improve their quality of life.

403.183 (Poster) Comparison between Brazilian and British Mothers Concerning the Diagnosis and Intervention of Their Children with ASD

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Background: The diagnosis of ASD in a child impact greatly on the whole family. Many families feel isolated and have little social support. Mothers, especially, report many symptoms of anxiety, depression, and stress. One of the main reasons for these symptoms is the long process of diagnosis and the subsequent search for treatments.

Each country has a public policy for diagnosis and treatment, and this situation, added to cultural issues, brings different ways of dealing with the situation and different perceptions.

Objectives: To compare the perception of Brazilians and British mothers about their experiences of the trajectory of searching for a diagnosis and treatment for autistic children. In addition, understanding how cultural aspects affect people's perception and behavior, in this case, mothers of children with ASD.

Methods: This is a cross-cultural qualitative study performed with a group of 10 Brazilian and 6 British mothers of children with ASD aged 6-12 years. Semi-structured interviews were conducted online and inquired about the journey of obtaining a diagnosis and treatment, and
the feelings involved in the process. Textual data analysis was performed using ALCESTE software to identify common aspects among mothers of both countries. The topics/classes were defined a posteriori.

Results: Brazilian mothers’ descriptions of their experiences were classified in three topics/classes, namely: Class 1: “Trajectory of interventions and satisfaction with the service provided” (54.10% of valid words), addressing contents indicative of the search for the best interventions for children, as well as the factors that make mothers continue or interrupt a therapy; the main keywords were person and professional. Class 2: “Challenges to recognizing the first signs of ASD” (31.45%), spoke about the mother’s difficulty in identifying the first signs of ASD before diagnosis; the main keywords were play and child. Class 3: “Trajectory to obtain the diagnosis” (14.54%), expressing the arduous search for a professional to diagnose children; The main words were pediatrician and neurologist.

The answers of British mothers were grouped a posteriori into three classes: Class 1: “Trajectory and difficulties in seeking intervention” (44.50% of valid words), which was characterized by reports about the difficulty of finding quality and reliable professionals; main keywords were a child and professional key. Class 2: “Social Skills and Functionality” (10.83%), which had as content the concern of mothers with the children’s challenges in the social and functional life of their children. The main keywords were power and part (party, parties). Class 3: “Diagnostic Challenges” (44.67%), in which the mothers talked about the difficulties of managing typical ASD behaviors and the challenges of acquiring knowledge on the subject; the main keywords knowing and diagnosis.

Conclusions: For Brazilian mothers, it was difficult to recognize the early signs of ASD and to get a diagnosis, while among British mothers, the main difficulty seemed to be acquiring knowledge after diagnosis to deal with the behavior’s problems. Also, there was a particular concern with the functional and social life of children post-diagnosis in the UK, which was not so important among Brazilian families.

403.184 (Poster) Cross-Cultural Comparison between the Experiences of Autistic Adults with Social Expectations in the UK and Spain before the Pandemic and during the First Covid-19 Lockdown in the UK


Background:

The socialising style of the autistic population informs diagnostic procedures. While Goffman theorised the social individual as a performer in front of an audience, camouflaging behaviours are known to be implemented by autistic people during social interactions to hide their own identity, comply with expectations, and also as a response to stigma. Camouflaging also impacts diagnostic processes, identity development, and may have damaging effects for the mental health associated to depression, anxiety, social isolation, or suicidal ideation.

As an emergency period was imposed in England due to the Covid-19 outbreak, the first lockdown involved lifestyle adaptations and movement restrictions. Research revealed positive experiences for the autistic population, such as flexibility of time and space, community connections and solidarity, and a reduction of the need for camouflaging. However, other research showed intense detriments related to depression, anxiety, loneliness, and uncertainty heightened by an inconsistent information surrounding the global situation.

Objectives:

This research aims at exploring the experiences of autistic adults with social expectations prior to the pandemic in the UK and Spain, comparing these to those lived during the early stages of the outbreak in the UK.

Methods:

Thirty-four photo elicitation interviews were analysed following a double-step, sequential process through first, a Reflexive Thematic Analysis and, second, the application of a phenomenological interpretation of eight fractions of the participants’ Lifeworld.

Results:

Prior to the Covid-19 pandemic, the findings from both countries indicate positive interactions between an autism diagnosis and the autistic identity. On the other hand, participants emphasised feeling in the middle of a social imbalance, being eager to socialise whilst perceiving the stigma towards autism and experiencing mental health detriments.
During the first Covid-19 lockdown in the UK, albeit reporting some pleasant experiences, a series of struggles were emphasised, such as living with uncertainty and anxiety whilst experiencing discriminating situations, altogether amplified by the ineffective reaction from the support services.

Conclusions:

Before the pandemic, the findings add information about the detrimental forces which constrain the lives of the autistic population. The participants felt overpowered by the harmful interplay of camouflaging, stigma, and mental health. A lifelong social discrepancy was found between feeling compelled to fulfill social expectations through camouflaging whilst facing the stigma towards autism, continuously living a Double Empathy Problem. These experiences generate feelings of guilt and loss of identity which enhance long-lasting mental health detriments.

During the first Covid-19 lockdown in the UK, whilst experiencing a reduction of societal expectations and the need to camouflage, the participants experienced permanent uncertainty and anxiety. Experiences of discrimination towards the autistic community revealed a structural stigma. When seeking support, a specialised, high-quality provision failed to reciprocate and meet their needs, contributing to intensify situations of vulnerability. A series of recommendations are highlighted to improve the support access and networks, whilst increasing the autistic community involvement and the available information.

403.185 (Poster) Cultural Diversity Career Advancement Program (C-CAP): Increasing Research from Low/Middle Income Countries


Background: A recent analysis identified that 95% of children with developmental disabilities under age 5 years reside in low/middle income countries (LMIC; Global Research on Developmental Disabilities Collaborators, 2018). However, strikingly little autism research is conducted in LMIC (Franz et al., 2017). LMIC are also the countries where most people, and therefore autistic people, live in the world. In the United States, a high-income country (HIC), there is a shortage of Black psychologists and underrepresented minorities in the field of ASD research. The manifestations of this absence are multifold, impacting ASD research itself, and further disenfranchising minority communities. Research is lacking in all areas, but particularly areas with direct impact on autistic individuals and their communities, such as epidemiology, intervention efficacy, health and education needs, lifespan needs, and community and cultural perspectives on autism.

Objectives: The INSAR Cultural diversity Career Advancement Program (C-CAP) was established in 2021 to provide mentorship to researchers, clinicians, and scholars from LMIC and underrepresented groups HIC, with the goal of advancing autism research. C-CAP is tracking enrollment of mentors and mentees and the outcomes and products that result from mentorship to evaluate the impact of cross-cultural mentoring on autism research.

Methods: C-CAP recruited and paired mentors and mentees who are required to meet consistently for at least a one-year period, with the goal to provide mentorship individualized to the mentee. Mentoring tools and a curriculum were developed to facilitate mentoring sessions, C-CAP also held webinars throughout the year with globally representative panels of experts to speak on topics of interest. C-CAP collected data on the number of mentor-mentee pairs, attendance at webinars, as well as webinar evaluations data. Surveys were distributed during C-CAP development and implementation to identify needed topics and curriculum materials, and evaluation surveys were collected after C-CAP webinars to assess satisfaction and utility.

Results: Twenty-eight students and early career researchers applied as mentees, and 20 ASD researchers from around the globe applied to be mentors through this initiative. Ten mentor pairs were created in year 1 of C-CAP, with each mentor peer mentoring 2-3 mentees. Webinars were completed on grant writing and manuscript preparation, attended by over 150 participants from a wide range of countries, and evaluation surveys showed high satisfaction and utility ratings. Surveys regarding mentoring progress and satisfaction with mentor-mentee pairs are underway, and descriptive results will be reported.

Conclusions: The successful implementation of C-CAP will serve to increase the number of autism and developmental disability researchers from, and in, LMIC and those from underrepresented groups in HIC, thereby helping expand the current boundaries of autism and developmental disability research and move toward a more comprehensive understanding of developmental disability and its impacts globally. Further expansion of such services, with the support of the members of INSAR, is needed to address the world-wide need for autism research.

403.186 (Poster) Culturally Responsive Support for Caregivers of Children with ASD: A Systematic Review

Objectives: The INSAR Cultural diversity Career Advancement Program (C-CAP) was established in 2021 to provide mentorship to researchers, clinicians, and scholars from LMIC and underrepresented groups HIC, with the goal of advancing autism research. C-CAP is tracking enrollment of mentors and mentees and the outcomes and products that result from mentorship to evaluate the impact of cross-cultural mentoring on autism research.

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Conclusions: The successful implementation of C-CAP will serve to increase the number of autism and developmental disability researchers from, and in, LMIC and those from underrepresented groups in HIC, thereby helping expand the current boundaries of autism and developmental disability research and move toward a more comprehensive understanding of developmental disability and its impacts globally. Further expansion of such services, with the support of the members of INSAR, is needed to address the world-wide need for autism research.
Background: Studies have shown that caregivers of children with ASD frequently experience depression and anxiety. Social supports such as psychological and emotional assistance, resources, and services appear to have positive effects on caregivers in terms of their personal well-being and child-rearing practices. However, social support programs that are effective for White, middle to upper-class, English-speaking caregivers may not have same effects on ethnically diverse or international communities.

Objectives: The present review aims to address the following questions: (a) What types of culturally responsive support programs are available for caregivers of children with ASD?, (b) What was the process to make the programs culturally appropriate?, and (c) Are culturally responsive support programs effective in improving caregiver outcomes?

Methods: Six electronic databases including American Psychological Association Psycnet, PubMed, ERIC, ProQuest Social Science Premium Collection, Academic search premier, and ProQuest Dissertations & Theses were used to search for articles that consist of a combination of following terms: (a) cultur* OR linguistic*, (b) adapt* OR appropriate OR tailor* OR sensitive OR responsive, (c) caregiver OR parent*, (d) train* OR coach* OR educat* OR support OR interven*, and (e) autism OR ASD OR autistic in their title or abstract. Eligible studies must provide information on the development/adaptation detail of a caregiver support program and/or examined effects of a culturally responsive caregiver support program. Also, the programs addressed in the studies must be for caregivers of autistic children ages birth through eight to be eligible. The following variables and outcomes were extracted to summarize the information from included articles: study design, purpose, target population, components of a support program, participants involved in the development/adaptation process and their characteristics, development/adaptation procedure, methodological rigor, as well as the implementation and outcomes.

Results: Nineteen studies met inclusion criteria and addressed fifteen different culturally responsive caregiver support programs. Findings suggested that nine of the programs were culturally adapted to meet unique needs of target populations while six were specifically developed for diverse or international communities. Eleven of the programs were for diverse caregiver communities in developed countries while four were for caregivers in low-resourced countries. Frameworks such as the Ecological Validity Model and the SHARP framework were applied in eight programs to facilitate their development or cultural adaptation. While community-based participatory research is an important approach to address disparities, six of the programs did not specify the inclusion of caregivers in their development/adaptation process. Sixteen studies reported the implementation of a support program and evaluated its effects. Twelve of the sixteen studies collected social validity data. Overall, caregivers participated in the support programs found the programs acceptable and beneficial, and they had increased confidence and frequency in implementing evidence-based intervention strategies. However, improvements in parental well-being were not consistently found across studies.

Conclusions: Future research needs to examine how effects of culturally adapted caregiver support programs are different from programs developed for target populations and how effects of culturally responsive caregiver support programs are different from those that are not tailored for target populations.

403.187  (Poster) Culture and Connection: Building Strong Home-School Partnerships with Culturally and Linguistically Diverse Families of Autistic Children

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Background:

Strong, effective partnerships between teachers and caregivers can substantially improve all children and young people’s success in and out of school, including autistic children and young people. Such partnerships may be especially important for autistic students since they can benefit from learning supports and consistent approaches across contexts. Yet, we know little about the experiences of home-school partnerships for families of autistic children from Culturally and Linguistically Diverse (CALD) backgrounds.

Objectives:

This research sought to bridge the gap in knowledge for CALD families of autistic children. Specifically, we worked with four separate community groups, namely Chinese, Vietnamese, Somali and Middle Eastern, to understand parents’ views and experiences of interacting with Australian schools for their autistic child(ren) and how culture might influence these interactions.
Methods:

We adopted a participatory approach. A team of autistic and non-autistic researchers worked together to make decisions about the overall study. Four separate advisory groups, each comprising 3-5 parents of autistic children from each community group, then collaborated with the broader team on individual projects. Semi-structured interviews were conducted with 56 parents (mostly mothers, aged 23 – 65 years) in preferred languages, including 17 Chinese parents, 15 Vietnamese parents, 15 Somali parents and 9 parents from Middle Eastern backgrounds. Parents together had 67 autistic children (aged 2 – 18 years), who attended kindergarten, primary and secondary schools across mainstream and specialist settings. Parents were asked about their and their child’s experiences of school, navigating the school system, and relationships with school staff. We followed Braun and Clarke’s method for reflexive thematic analysis to analyse the data using an inductive (bottom-up) approach to identify patterned meanings within the dataset.

Results:

Despite the differences between the four communities, parents shared a range of (mostly negative) experiences as they navigated the schooling system. Many parents were respectful and deferential towards teachers and had clear role boundaries between themselves and educators. They reported having high expectations for their children but were disappointed these were not shared by teachers. They were further frustrated by the apparently limited teacher knowledge of autism and the inadequate and inconsistent communication from schools. These issues were exacerbated by parents’ own difficulties with spoken and written English and their limited understanding of Australian education and funding systems. Parents also reported experiencing widespread stigma and misunderstanding about autism in their own communities, as well as overt discrimination, with racial profiling and prejudice reported. Despite stigma, limited resources and deference, many parents felt that they had no choice but to advocate on behalf of their children and their community.

Conclusions:

In this study, we elicited the views and experiences of parents from CALD backgrounds, who are all too often overlooked in autism research. Their testimonies reveal important ways to encourage more successful partnerships between CALD communities and kindergartens/schools, ensuring that these settings are more inclusive and culturally safe for families. Future research should examine the most effective ways that parents and schools can collaborate to help secure positive futures for autistic children with CALD backgrounds.

403.188 (Poster) Development of Spark@Grow Developmental Screening Mobile Application in Malaysia

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Background: Importance of early screening for neurodevelopmental disorders (NDD) has increasingly been recognised. However, there are barriers to effective developmental screening in Malaysia: low awareness of NDD; low paediatrician-to-children ratio (0.08:1000); lack of culturally relevant screening tool; and COVID-19 pandemic.

Objectives: (1) To develop a mobile application for Malaysian parents to conduct developmental screening on infants and toddlers of zero to 23-month-old. (2) To examine the feasibility and user-friendliness of the mobile application.

Methods: During Stage One, a panel of four subject matter experts (SMEs) was formed. They rated developmental milestones from a few widely used developmental screening tools and developmental milestones guidelines on a five-point Likert’s scale to determine the suitable milestones to be used as NDD red flags in Malaysia. Fifty-six new items were developed for four domains: Motor Development (Gross and Fine Motor), Speech and Language Development, Social-Emotional Development, and Cognitive Development. Each item was asking for corresponding milestone were stated. Methods to assess each item were also listed out.

In Stage Two, the newly developed 56 items were then built into a mobile application (Spark@grow) by computer science personnel, containing features such as developmental screening items, pictures and video demonstrations, and brief reports. In Spark@grow, there were two types of items: parents’ proxy report items and interactive games.

Stage Three was a pilot study to examine the feasibility and user-friendliness of Spark@grow via cognitive interview and User-Experience Questionnaire. Fifty-six Malaysian parents (mean age = 21.17, SD = 1.12) with various ethnicities and income levels were recruited from Klang Valley. They conducted developmental screening on their children (age between 0 to 23 months) using Spark@grow. Then, they rated the user-friendliness of Spark@grow and the researcher conducted one-on-one cognitive interviews with them.

Results: Spark@grow was reported easy to used by the participants (e.g., Perspicuity subscale, $M = 1.70, S.D. = 0.90$). All 56 participants were able to download and use Spark@grow to complete the developmental screening independently without additional guidance on the general operation. They also had no trouble recalling their children’s attainment of milestones and providing specific examples of those
attainments. Most items were found to be easy to understand and relevant to their children’s development by the participants. The interactive games were also found to be feasible for some children. However, some items needed to be amended to improve their clarity and relevance. Alternative assessments (for interactive games) should also be provided to children who had not been exposed to smartphones before.

Conclusions: Spark@grow was both feasible and user-friendly for parents of 0- to 23-month-old children in Malaysia. It had great potential to improve the effectiveness of developmental screening in Malaysia.

**403.189 (Poster) Dutch and Romanian Teachers’ Attitudes Towards Inclusive Education Related to Self-Efficacy, Burnout, and Autism Knowledge and Stigma**

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**Background:**

Inclusive education endorses autistic children’s rights to receive the support needed to achieve their full academic potential. It has its roots in social justice and attempts to move away from a medical classification model of care needs. Instead, it promotes inclusive societies, social participation, and the value of diversity. Knowledge and beliefs about the etiology of autism may be associated with attitudes towards inclusive education.

**Objectives:**

We aimed to examine factors that potentially impact the success of teacher training to increase autism knowledge and reduce stigma in two European countries. We focused on teachers’ attitudes concerning core perspectives, expected outcomes and classroom practices for inclusive education and self-efficacy, as these are known to be important for inclusive education. We hypothesized that less self-efficacy, less autism knowledge, more autism stigma, more student-related burnout, not knowing autistic persons outside of work, less teaching experience, no (post)master’s degree in Educational Needs, and demographics (being a teacher versus a trainee, working in special education, country, and sex) would predict teachers’ negative attitudes. Also, we hypothesized that the negative effects of no (post)master’s degree, working in special education, and more student-related burnout on teachers’ attitudes would be partially mediated by lower self-efficacy. For country and sex, we had no specific expectations for the direction of effects.

**Methods:**

Dutch and Romanian teachers and trainees \((N = 1509)\) reported their attitudes, self-efficacy, burnout symptoms, autism knowledge and stigma, teaching and training experience, and several demographic factors. Path analysis with manual backward selection indicated which teacher- and work-related factors were associated with teacher attitudes concerning core perspectives, expected outcomes and classroom practices for inclusive education.

**Results:**

Teacher’s attitudes towards classroom practices associated with inclusive education were more negative than their neutral attitudes towards core perspectives and expected outcomes. Attitudes differed depending on whether participants were Romanian or Dutch and a teacher or a trainee, mediated by self-efficacy. Most predictive for a negative attitude towards inclusive education were having low self-efficacy, autism stigma and reporting student-related burnout. Self-efficacy mediated the effect of burnout.

**Conclusions:**

We now have a better understanding of which factors are related to teachers’ attitudes towards inclusive education for autistic students in different populations. Our results confirm that teachers who perceive themselves as effective teachers are indeed those who have positive attitudes towards inclusive education. In addition, teachers who have positive attitudes are those who experience little or no student-related burnout and those who do not subscribe to stigmatizing ideas about autism. When implementing inclusive practices in primary and secondary education, policy makers and care professionals should focus on making teachers feel efficient and energized in addition to preventing or correcting misconceptions about autistic students.

**403.190 (Poster) Educational Experiences of Marginalised Children and Their Families**

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Background:

The autism research community is increasingly aware that certain groups are often marginalised from community settings (such as schools) because of their status in terms of ethnicity, language and socio-economic status. They are also a voice that is often absent from research studies. Education performance in the general UK school population varies depending on the ethnic background of students, the area of the country the school is located and whether parents have achieved in their own schooling (Boag-Munroe and Evangelou 2012). Moreover, given the current climate with Covid-19, children in the UK from these often-marginalised groups were identified by UNICEF (2020) as those who experienced the greatest negative impact on their education.

Objectives:

This England based study focused on children and families who are marginalised because of four reasons; (1) belonging to minority ethnic communities, (2) whose first language is not English, (3) families from poorer socio-economic backgrounds, (4) and children who are in social care. The main objective of the research was to understand the educational experiences of families belonging to these communities and to understand the experiences of educational staff in supporting these children and their families.

Methods:

Online interviews were conducted with 21 parents from various parts of England. Online questionnaires were used to collect data from 11 local educational authorities and 27 teachers with follow up interviews with 20 educational professionals.

Results:

Descriptive statistics and thematic analysis was used to analyse data produced from questionnaires and interviews. Our data shows that educational professionals feel that they face specific challenges in communicating with families from marginalised communities. They also feel that families belonging to minority ethnic communities are less accepting of their child’s autism. Lack of teachers’ knowledge about diversity and autism and limited resources have been identified as main barriers in supporting such children and their families. Most parents in this study have expressed that their families had negative experiences in the education system. This was mainly the result of limited knowledge amongst the staff and lack of inclusive practice. Families reported they felt stigmatised by teachers/schools as well as wider community. Positive experiences were often the result of finding a ‘good’ professional.

Conclusions:

The results indicate that parents from marginalised backgrounds feel discriminated at multiple levels and are often misunderstood by educational professionals. It appears that there is difference of views between both sets of participants as to where the problems lie, with educational professionals sometimes blaming families. There is a clear need for better knowledge amongst school staff about the impact of cultural, linguistic and social economic backgrounds on the experiences of children and their families. More research is required in this area to develop principles of good practice for working with marginalised families, especially in the current climate of limited economic resources.

403.191 (Poster) Eight Years on : Training Professionals in Autistic Girls and Women in Hispanic Countries
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Background:

Awareness and recognition of the presentation and diagnosis in autistic girls and women (AGW) is relatively recent. Additional language barriers might present in those countries where updated research findings and training of professionals is not widespread like many Hispanic-American countries. As many experts reported, training and education of the presentation and research findings along with experience, is one of the roads for a better identification and equity in autism. We report a project of 8 years for AGW.

Objectives:

We analyzed quantitative descriptive data from for awareness, support and training for professionals in AGW, in collaboration with autistic women (AW), and mothers of autistic girls (AG) from 2014-2022. The project has three main areas, empowerment for AW, support for mothers of AG and training for professionals working with AGW.

Methods:
We conducted a year to year analysis of all the actions in each domain to assess results to have an estimate of the impact in Hispanic professionals from different countries.

Results:

4 AW Voices Symposium with 10/15 AW participating in each one. A total of 40 AW participated and collaborated in the training project, symposiums and university courses. Online support group was the first in Spanish and with over a 100 international members.

Online support mothers groups during 8 years had an average of 1100 members. In 2021-2022, 12 online meetings were set up with 300 participants from 5 countries. The group was coordinated by mothers of AG the focus for the meetings were support, caregiver care and quality of life.

Professional trainings we delivered in short courses (8hr.) with an average of 2 per year, total 16, with over a 1000 participants 2014-2022. A University Diploma (100 hr.) training in person in 2019 and online in 2022. A University Program (50 hr.) online in 2020, 2021, 2022 due to COVID. Over 170 professionals participated in the 50 hr. courses online from 11 countries, and another 97 participated in the 100 hr. course from 12 countries. Additionally, over the 2014-2022, we delivered over 30 short conferences in 8 countries with a total of 2000 participants and collaborated with more than 10 Universities, and 15 organizations. More than 30 professionals participated from Spanish speaking countries. Overall 3277 professionals participated.

In the time frame analysis, the amount of professionals interested in AGW grew exponentially, and awareness and services became more available in different Spanish speaking countries. We are still collecting ongoing data analysis to have a map, directory and distribution of professionals and services.

Conclusions:

Barriers to the access to diagnosis and support for AGW are common worldwide, but some countries might be more advanced than others in putting research intro practice. Language was a barrier for many Spanish speaking countries at the beginning of the project. After 8 years, the area of AGW with autism is installed in the scientific, academic, and advocate agenda in many Spanish speaking countries and in an ongoing process. We suggest that many mid-and low income countries with language, economic, or cultural barriers might face similar challenges.

403.192 (Poster) Ethnicity and Language Information for Autistic Patients within the Asian Diaspora Is Limited in Healthcare Records


Background: Research on autistic individuals within the Asian diaspora is very limited. In large health systems, the electronic health record (EHR) should contain the information needed to support culturally responsive care and research about patients and families’ Autism experiences across the lifespan. Unfortunately, the widely used default “Asian” demographic variable in most US social systems (including EHR) lacks the inclusion of critical information that attends to the diverse experience within the Asian diaspora (e.g., ethnicities, languages). Identifying family’s cultural identities and experience have shown invaluable in supporting culturally responsive autism care for providers (e.g., help-seeking behaviors, treatment choices). Identifying what is present and missing is a critical first step toward building a social system that is inclusive and responsive to all identities of Autistic individuals within the Asian diaspora.

Objectives: First, we set out to determine what demographic information could be found within the EHR to potentially describe the intersectional experience of the families of Autistic children from the Asian diaspora. Second, the reliability and validity of documentation related to referrals, diagnostics, and intervention were examined.

Methods: Participants came from a published toddler cohort of 25,999 children (Guthrie et al., 2019). Fifty-three children were both Autistic and identified as “Asian” in their EHR. Manual chart reviews were conducted on all 53 and identified any reference to referrals from progress notes, diagnostics, direct evaluation reports, or scanned external documents, per Wong et al.’s (2023 INSAR abstract submission) methods. If dates were not explicitly reported, they were estimated with consensus from the study team. Each chart review took at least 45 minutes. 10% of records were reviewed twice.

Results: Specific demographic information was inconsistently documented in the EHR, even if the family had immigrated relatively recently or was multilingual. We could not identify any documentation of specific ethnicity (i.e. country of origin before migrating) for 24.5% of families (Table 1). Similarly, family language information was inconsistently recorded. For example, of the 53 in the sample, 58.5% were multilingual. Of these, 13.2% routinely asked for an interpreter, 83.9% did not. While at least 10 different Asian languages were identified, many families’ specific languages were not documented. Regarding clinical care, like Wong et al., we found high rates of
reliable documentation for Autism diagnostic evaluations (inter-rater reliability on 10% of records was >90%), but not for the dates of general intervention initiation, Autism diagnostic referral or for Autism-specific interventions (inter-rater reliabilities were below 60%).

Conclusions: The Asian diaspora is often excluded in research and practice. Illuminating what’s absent is as critical as what’s available in the EHR system to improve cultural responsiveness in current healthcare practices with the diverse Asian diaspora. A sample of 53 children does not reflect the entire community. However, our preliminary results highlight that culturally responsive information was inconsistently recorded or completely missed. Next steps include (1) understanding how demographic information is collected at healthcare visits, and (2) qualitatively analyzing progress notes and other documentation to describe the families’ experience from screening to diagnosis to intervention.

403.193 (Poster) Evaluating the Caregiver Skills Training Program for Ethiopian and Eritrean Immigrant Families of Children with Autism
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Background:
Compared with children of US-born parents, children with autism spectrum disorder (ASD) in immigrant families confront unique challenges in accessing healthcare services. One of the main challenges is limited access to quality parenting programs that may improve child outcomes, decrease parent stress, and increase parent efficacy. In addition to stressors commonly affecting families raising children with autism, immigrant families often experience some unique stressors, including trauma and negative cultural attitudes toward autism. Thus, family-centered, culturally responsive, trauma-informed approaches are critically needed to serve these vulnerable populations. Furthermore, among the largest and fastest-growing immigrant populations in the US are the Ethiopian and Eritrean Americans. For these immigrant families, navigating the healthcare system and accessing services for their members with ASD could be a daunting experience. The World Health Organization Caregiver Skills Training (CST) program has been implemented in the Ethiopian context (Tekola et al., 2018). Yet, no published literature has focused on Ethiopian immigrants in the US or elsewhere.

Objectives:
To explore the acceptability and feasibility of an adapted version of a 12-session manualized program among Ethiopian and Eritrean immigrant caregivers raising children with ASD (ages 2-9) in the US. This project aims to support Ethiopian and Eritrean immigrant families of children with ASD to increase their quality of life and reduce stress.

Methods:
We used mixed methods to adapt, pilot, and evaluate CST for Ethiopian and Eritrean American immigrant families. We formed an advisory board composed of Ethiopian and Eritrean parents, community leaders, providers, and other stakeholders to review the CST manual and provide recommendations for program adaptations. We also recruited four Master Trainers to pre-pilot CST and trained three facilitators for the pilot phase. The trainers delivered the program to five groups of parents (N=30). Participants completed pre-post measures on parenting stress, anxiety, depression, and coping; autism knowledge; family empowerment; child behavior and communication; and feedback forms after home visits and group sessions. The Master Trainers collected attendance data and completed feedback forms after each group session. Finally, we conducted post-program focus groups with participants, Master Trainers, and facilitators.

Results:
This study has completed data collection and is in the data analysis phase. We will present CST feasibility and acceptability results for the Ethiopian and Eritrean American communities based on integrated data from the focus groups, attendance, and post-session feedback forms. Our preliminary analyses have found overall high acceptability of program content. Suggestions for improvement included refining the Amharic translations and providing options for parent self-care.

Conclusions:
We undertook a significant stakeholder-engaged process to adapt, pilot, and evaluate an intervention aimed at Ethiopian and Eritrean immigrant families raising autistic children in the US. The results of this study can inform future efforts to deliver culturally responsive psychoeducation to diverse families raising young children with autism.

403.194 (Poster) Examining the Potential for Future Educators to Combat Autism Stigma in Their Communities through a Cross-Cultural Lens
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Background: Family members of autistic people experience stigma, which may be heightened in some Asian cultures due to pressure to conform to social norms (Liao et al., 2019). High academic pressures may contribute to stigma towards families of autistic people in Hong Kong (HK; Mak & Kwok, 2010). Future educators may be uniquely situated to help autistic people and their families combat stigma. Experience educating autistic students can foster beliefs and practices that are vital for combating stigma (Segall, 2008).

Objectives:

1) Examine if prior experience educating autistic people influences preservice teachers’ confidence educating autistic people in HK and Canada,

2) Evaluate if prior experience and country impact beliefs about how community members treat family members of autistic people,

3) Explore beliefs about clinicians/educators’ influence on attitudes toward autistic people in their communities in HK.

Methods: Preservice teachers from HK (n=57) and Canada (n=56) answered: “How confident are you in your ability to interact with an autistic person as an educator/support staff?”, “Have you been an educator for autistic people in the past?” and: “How do people in your community/ies treat family members of autistic people?”. Participants from HK (n=35) answered, “How do clinicians and educators influence attitudes toward autism in your community/ies?”. Responses were coded after inter-rater reliability > 80% was reached for 20% of the data. Reliability wasn’t obtained for one code, excluded from analyses.

Results:

Preservice educators in HK (53%) were more likely to report experience educating autistic people (24%; p=.002) but less confidence educating autistic people (M=3.51, SD=.928) than participants in Canada (M=3.96, SD=.719 ; p<.001).

Participants in Canada were less likely to say family members of autistic people were treated with pity/sympathy (p=.008) and more likely to say they were treated indifferently (p=.007) than Hongkongers (Table 1). Participants in both countries with experience educating autistic people were more likely to state that community attitudes towards family members were negative than those without experience (ps<.05).

Most respondents thought clinicians/educators had a positive effect on community attitudes towards autism (Table 2). Although the question asked about community attitudes, many shared how their own attitudes changed through the influence of clinicians/educators or through experiences as an educator (e.g. “There are psychologists explaining autism..makes me more empathetic” or “I’ve learnt how to get along with them and have become more accepting…”).

Conclusions: Preservice teachers in HK reported less confidence educating autistic people than peers in Canada, despite more experience, suggesting limited training and/or challenging working conditions. Preservice teachers with experience educating autistic people in both Canada and HK were more aware of negative community attitudes towards family members of autistic people than those without experience. They believed that clinicians/educators have a positive effect on community attitudes. These findings suggest that educators are potential agents of change in their communities when it comes to combating stigma against autistic people and their family members, but need support.

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**403.195 (Poster) Exploring International Differences to Sentencing Settings and Practices for Autistic Individuals: A Qualitative Comparative Study**


Background: Autism and criminal justice system intersections are garnering increasing attention, and sharing best practices and models across nations is critical for improving outcomes. Innovative policies and programs are emerging globally that are rooted in rehabilitation and offer an evidence base for adaptions within varying justice systems and nation-specific contexts. A key driver for international differences in justice systems involves how nations prioritize rehabilitation versus punishing convicted offenders. Some nations, like the
United States tend to opt for more punitive sentencing options. Scandinavian countries, however, often emphasize diversion and rehabilitation. For autistic individuals who interact with the justice system frequently, the approach each nation takes is consequential, especially as individuals become further enmeshed in the justice system. Research has demonstrated that incarcerated autistic individuals find prison experiences to be overwhelmingly and uniquely negative with frequent victimization from other inmates and high rates of self-harm.

Objectives: The objectives of this study are to examine and discern differences in sentencing settings and practices across nations to inform best practices.

Methods: Field leading experts collaborated in a qualitative comparative study to document and contrast sentencing settings and practices for autistic offenders in nations around the world. Correctional institutions from the state of Pennsylvania in the United States were included, along with institutions in various Scandinavian countries.

Results: Within Pennsylvania, where the justice system is the primary response to illegal activities, even by autistic individuals, there is significant variability between how, and if, state correctional institutions provide accommodations and support. This variability is reflective of the even more stark differences that occur in settings at the local, state, and federal levels of the United States. Although notable variations exist between Scandinavian countries, experts determined that the greatest differences were between Pennsylvania and Scandinavia overall. For instance, rehabilitation was prioritized through mandatory care practices in Norway and sentences for care in Sweden. In Norway, a national forensic unit is responsible for treatment and risk management for all persons convicted to mandatory care. After a relatively short stay in a specialized institution, autistic individuals are established in their home district in a specially adapted home under national unit supervision. In Sweden approximately 60% of all serious offenders with autism are referred to forensic psychiatric care. However, current legislation contributes to significant lengths of stay and autism awareness among staff is varying.

Conclusions: As the autistic population ages and high rates of contact with the justice system continue, varying sentences contribute to differential re-entry outcomes. Results from this study indicate that more rehabilitative practices are occurring in Scandinavian correctional institutions, compared to Pennsylvania. However, certain institutions in Pennsylvania are shifting significantly and implementing reforms to better mirror Scandinavian counterparts. These changes are rooted in rehabilitating convicted offenders to better transition back to communities post-sentencing. As Scandinavian institutions offer guidance for other nations to adopt, the reforms occurring in Pennsylvania institutions can inform needed changes to settings in the nation with the largest prison population.

403.196 (Poster) Understanding the Perspectives of Autistic Bilingual Children
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Background:

There are unfounded concerns among parents and practitioners that bilingualism may be harmful for autistic children. As a result, many autistic children are being denied access to dual language learning. These concerns are not based on evidence, and research suggests that bilingualism could confer some advantages in cognitive and social domains and wellbeing. However, research to date is limited and disregards the child’s own lived experiences of bilingualism. Important questions remain about how autistic children view the impact of bilingualism on their cultural identity, community inclusion and quality of life.

Objectives:

The aim of this research is to understand the perspectives of autistic bilingual children with a focus on cultural and linguistic experiences. In order to do this, we co-created an autism-specific interview tool with members of the autism community, families and practitioners.

Methods:

Twelve participants (aged 8-17 years, 5 male, 7 female) were recruited. Participants were based in the UK and had received a diagnosis of autism. The interview tools were co-produced with parents, practitioners, and a Young Researcher advisory group; a group of three autistic bilingual young people, aged 19-21 years. Three iterations of the interview tool were designed to accommodate a wide range of communication and support needs, including minimally verbal young people. Participants completed one of the following: a talking interview, an activity-based interview, or a simplified activity-based interview. Areas of focus for the interview tool were:

- Exploring children’s understanding of being autistic and bilingual
- Family and sibling dynamics
- Everyday life experiences including friends and hobbies
• Situation-dependent language use and emotion-dependent language use

Results:

The interview data of nine participants with a sole diagnosis of autism were analysed using thematic analysis. Interview data of autistic participants with an intellectual disability were analysed using interpretative phenomenological analysis.

The emerging results show that bilingualism plays a key role in the identity of the participants. The interviews demonstrated the value of exposure to the family language as an additional means of self-expression for younger participants, and as a means of fostering relationships and communication with non-English-speaking relatives for older participants. Participants who were confident using their family language were able to demonstrate a deeper understanding of their culture and family. Those who were less fluent expressed a desire to improve their family language so they are better able to engage with their relatives. Participants with an intellectual disability comfortably switched between speaking English with their interviewer and family language with their parents, providing them with clarification and comfort during the interview.

Conclusions:

There is a wealth of information and insight that can be offered by autistic bilingual children regarding the value that bilingualism brings to their lives and the challenges that come with it. This is the first study to examine the experiences of autistic bilingual children outside of a school setting. The results from this study will ensure that families and practitioners consider the importance of children’s relationships with their cultural identity and the role language plays in that experience.

403.197 (Poster) Toddler Autism Symptom Inventory (TASI) in Spanish: Preliminary Results of a Validation Study


Background: Best practices for detection of autism spectrum disorder (ASD) symptoms in early childhood integrates assessment of the child’s usual behaviors through parent report with a clinician’s behavioral observation. The most commonly used diagnostic interview in research, the Autism Diagnostic Interview, Revised (ADI-R), has limited utility for very young children, and it is costly and labor intensive to learn to administer and code reliably. Further, it covers the lifespan, rather than targeting symptom expression in toddlers. The Toddler Autism Symptom Inventory (TASI) is a parent interview tool to assess autism symptoms in children ages 12 to 36 months, with good inter-rater reliability, easy to administer, and affordable. However, its use has been limited in other languages is essential to promote global equity in ASD diagnosis.

Objectives: To determine the preliminary psychometric properties of the Toddler Autism Symptom Inventory (TASI) in Spanish.

Methods: We recruited 51 toddlers (Nmale=30, Mean age=2.6 y, SD=0.72) and their parents who attended diagnostic evaluations after screening “at risk” on M-CHAT-R/F through a research study either in Monterrey, Mexico (N=38) or Texas, USA (N=13). We collected demographic information to characterize the sample. The diagnostic evaluation included a developmental assessment (Merrill-Palmer for Monterrey subsample, and Mullen Scales of Early Learning for Texas subsample), and an autism-specific assessment (Autism Diagnostic Observation Schedule, 2nd ed., ADOS-2) and the Toddler Autism Symptom Inventory (TASI) in Spanish. Experienced bilingual clinicians conducted all evaluations. A 2x2 table was generated to calculate sensitivity and specificity of the TASI.

Results: From the 51 children who were assessed, 42 were diagnosed with ASD, 5 with developmental delay, one with language delay, and 3 were typically developing. Sensitivity for the TASI in Spanish was 100% and specificity was 33.33%.

Conclusions: The TASI in Spanish was useful in collecting parent report for ASD-related symptoms, with a sensitivity of 100% in a sample of children who had screened at risk. However, specificity was unacceptably low (only 3 of 9 nonASD cases were correctly classified); differentiating ASD from other developmental delays is critical for the TASI’s utility. Future research will evaluate TASI in a larger sample of children who do not have autism, and will examine performance of specific TASI items and domains, in order to identify areas where additional cultural adaptation may be warranted.

403.198 (Poster) Impact of Autism-Related Stigma on Social Camouflaging: A Cross-Cultural Study
Background: Social camouflaging (Hull et al., 2017) is the strategy used by autistic people to hide or mask their autistic traits. Camouflaging contributes to social adaptation and leads to extreme fatigue, depression, and anxiety. Previous studies have suggested that camouflaging is a response to autism-related stigma, but there are very few quantitative studies investigating their relationships.

Objectives: This study aimed to quantitively investigate the relationships between camouflaging and autism-related stigma drawing on Social Identity Theory (Cooper et al., 2017; SIT). We established four hypotheses: 1) Perceived stigma positively predicts camouflaging, and 2) Individualistic strategy use seems to be similar to camouflaging and positively correlates with camouflaging. Conversely, collective strategy use seems to be the opposite of camouflaging; it negatively predicts camouflaging. 3) Camouflaging mediates the negative impact of stigma on the mental health of autistic people. 4) The degrees of camouflaging and perceived stigma differ by cultural, social, and ethnic background.

Methods: This study is a quasi-replication of the study conducted by Perry et al. in 2021. We studied 287 individuals diagnosed with autism spectrum disorder aged between 20 and 63. The participants completed an online survey regarding their social camouflaging, perceived stigma, strategies against stigma, depression, generalized anxiety, social anxiety, and mental well-being. Two multiple regressions were run for hypotheses one and two, investigating the effect of stigma on camouflaging and strategy use. Four mediation models were employed to test hypothesis three. For hypothesis four, we used two-sample t-tests for summary data to compare participants of our study with those of Perry et al.’s.

Results: Stigma (B=2.43, p<0.001) and individualistic strategy use (B=0.84, p<0.001) positively predicted camouflaging of autistic people. Contrary to our hypothesis, collective strategy use has also positively correlated with camouflaging (B=0.19, p=0.02). The results of mediation analyses showed that camouflage mediated relationships between stigma and depression (99% CI 0.06 to 0.08), generalized anxiety (99% CI 0.02 to 0.04), and social anxiety (99% CI 0.021 to 0.024). However, there was no significant mediation effect on the relationship between stigma and mental well-being (99% CI -0.14 to 0.09).

The results of two sample t-tests for summary data suggested that Japanese people had less perceived stigma (t=-9.21, p<0.001), less camouflaged (t=-8.00, p<0.001), had more negative well-being(t=-4.95, p<0.001). Moreover, compared to western people, the Japanese tended to use individualistic strategies against stigma(t= 5.43, p<0.001).

Conclusions: The results supported the hypothesis that camouflage response to stigma. In the framework of SIT, camouflage was considered to be very similar to the individualistic strategy. However, it might be a more multifactorial concept. The negative impacts of stigma on the mental health of autistic people were due to increased camouflage, at least in part. Compared with the results of Perry et al.’s study, the degrees of perceived stigma, camouflaging, and mental health conditions of autistic people might differ by cultural, social, and ethnic background.

403.199 (Poster) Implementation Drivers for Improved ASD Educational Service Delivery in South Africa
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Background:
Educational systems in South Africa are challenged with meeting the needs of children with autism spectrum disorder (ASD) and many children are out of school or inappropriately placed in the system. Therefore, a whole systems analysis of the ‘hardware’ and ‘software’ elements of the education system for children with ASD was performed to generate data informed recommendations for ASD educational service improvements.

Objectives:
The objectives of the study were to understand the landscape of education for children with ASD and to generate evidence-based recommendations to strengthen ASD educational service delivery.

Methods:
An exploratory mixed-methods approach was used across two phases. The first quantitative phase described the profile of children with ASD in the education system as well as those waiting for educational services. The second qualitative phase examined stakeholder perspectives of current ASD educational and other services and recommendations for service improvements.
Results:

Synthesis of findings across the study generated six key actions for service improvements that included a) designing and implementing early intervention programmes, b) developing curricular to accommodate a range of diverse learning needs, c) inclusion of children with ASD across the education system, d) creating a dedicated rural inclusive ASD plan, e) developing transectoral planning, monitoring and evaluation systems and f) developing integrated policies for ASD. Implementation drivers including competency drivers, leadership drivers and organizational drivers could potentially translate these actions into practice for improved ASD service delivery.

Conclusions:

The six actions generated in this study aligns with the Lancet Commission Report on the future of care and clinical research in autism and if implemented could go a long way in improving services for children with ASD and their families in South Africa. Findings from this study may have relevance to other low- and middle-income countries.

403.200 (Poster) Implementation of the Echo Autism Model in North Macedonia: Understanding Professional Development Needs and Barriers for Educators in the Classroom and Beyond


Background: The estimated prevalence of autism spectrum disorder (ASD) worldwide is approximately 1 in 100 children (1). In Eastern Europe, research is limited, including in North Macedonia. There is a dearth of specialists and decreased access to evidence-based practices for clinicians and educators. The Project Extension for Community Healthcare Outcomes (ECHO) framework represents an innovative solution for building capacity for best-practice in healthcare and education for autistic people. ECHO Autism leverages technology to train community-based clinicians or educators through mentoring, case-based learning, and guided practice. The ECHO Autism model is an innovative global model that adapts to local and regional norms and constructs. The model supports local professionals working with autistic people from childhood to late adulthood. In December 2021, 70 CVETOVI ECHO Autism, a hub of ECHO Autism Communities, launched a pilot project to increase access to evidence-based practices for educators in North Macedonia and Europe.

Objectives: 70 CVETOVI ECHO Autism’s objective is to increase access to evidence-based practices for educators in Europe. This pilot project aims to decrease disparities in knowledge and training of professionals in the education and medical fields and increase access to best-practice care for individuals with autism throughout the region.

Methods: 70 CVETOVI ECHO Autism’s team of specialists includes developmental-behavioral pediatrics, speech and language pathology, child psychiatry, and psychology. It meets monthly and includes a de-identified case study from one of the participating schools, followed by a discussion with the hub team and participating professionals, and an autism-focused didactic to reinforce specific knowledge. Didactics have been selected based on participant-identified need and include: the Project ECHO model; autism & co-occurring conditions; apraxia; strategies for the classroom for deaf autistic children; and management of challenging behaviors and tics in the classroom.

Results: To date, 70 CVETOVI ECHO Autism includes 7 sessions with 149 attendees from 8 different countries. Forty-two percent of participants are therapists, 27% physicians, 19% mainstream educators, 18% special educators, and 4% autism advocates. Didactics have focused on strategies to support educators in the classroom. Data collection is ongoing for qualitative feedback from participants.

Conclusions: ECHO Autism is a feasible and acceptable model to increase access to evidence-based practices with professionals in Europe. To our knowledge, 70 CVETOVI ECHO Autism is the first in Europe and is well received by educators. The ECHO Autism program in North Macedonia demonstrates the adaptability of the model to reduce disparities across cultures and professional disciplines. Future directions include adding educators to the hub team as well as improving access to screening and diagnostic protocols in the educational setting.

403.201 (Poster) Implementation of the Echo Autism Model in Poland

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Background: The Extension for Community Health Outcomes (ECHO) Autism model is now for the first time introduced in Poland (Rynkiewicz et al. 2022; Sohl et al. 2022). ECHO Autism is disseminated globally due to its flexibility in adapting to local and regional differences in social norms and constructs. The model supports local professionals working with patients with autism spectrum disorder (ASD) from childhood to late adulthood. ASD is more common among males than females where autistic females still represent a highly underestimated and underserved group of ASD patients. Especially adult autistic women, are particularly affected by insufficient knowledge and shortage of trained specialists (Karavidas & Visser, 2022; Moseley et al. 2021). Standard curriculum in medical schools and professional development curriculum for general clinicians in Poland often lacks specificity in core elements of ASD and standardized instruments used in ASD assessment.

Objectives: The project aims to train professionals in best-practice care of ASD patients and guided practice on the comorbidities in ASD, with main focus on underserved population of autistic females. It also aims to train in the standardized assessments of ADI-R and ADOS-2, creating the meaningful collaboration between global ECHO Autism teams.

Methods: In mid-2022, ECHO Autism Poland, a hub of ECHO Autism Communities, launched a pilot project to increase access to evidence-based practices and specialized trainings in standardized instruments: ADI-R (Autism Diagnostic Interview – Revised) and ADOS-2 (Autism Diagnostic Observation Schedule, Second Edition) for clinicians in Poland. Both instruments have been available in clinical practices in Poland only in recent years: ADI-R since 2021, ADOS-2 since 2017. Subject matter experts of Polish hub include psychiatrists, pediatricians, child and adolescent psychiatrists, speech and language pathologists, educators, physical therapists, psychologists additionally to adult autistic individuals, their parents, grandparents and sibling which constitutes the fundamentals of this model.

Results: In the first 2-months circle of implementation of the project over 200 Polish professionals were trained in ADI-R and ADOS-2 by certified, internationally recognized trainers. Participants emphasized the opportunity to be able to develop strong multidisciplinary networks and collaborative partnerships across the sites.

Conclusions: For the first time, to our knowledge, the activities and results of ECHO Autism model in Poland are presented. This model has already created the network of collaboration among the local partners in Poland and global partners. ECHO Autism in Poland shows great promise to create the opportunities for meaningful collaboration between global teams and valuable cross-cultural learning.

403.202 (Poster) Improvement of Social Communication with Caregivers Skills Training Intervention in Argentinian Population - Preliminary Findings

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Background:

It is known that early intervention strategies may significantly improve the development of children with social communication impairments. In Argentina, such services in the public health system are scarce. In this context, parent mediated interventions could help reduce expand health services in an economically feasible way. Among such interventions, the Caregivers Skills Training (CST) is a family centered approach that focuses on training parents and caregivers in using daily living activities, routines and play activities as an opportunity for development and learning. This program comprises 3 individual home visits and 8 group sessions that address strategies to improve social communication, interaction, challenging behaviors and coping skills for caregivers.

Objectives: To assess the effectivity of CST intervention on social communication skills of children with neurodevelopmental disorders.

Methods: We report the preliminary findings of a 20 week follow up of children who received the CST intervention delivered remotely, as part of a randomized controlled trial. The sample (n=30) included minimally verbal children aged between 2-4,11 years old with social communication impairments. To assess social communication changes the Brief Observation of Social Communication Change (BOSCC) was applied at baseline (T1) and on the follow ups on weeks 12 (T2) and 20 (T3). Additionally, the Achenbach Child Behavior Checklist (CBCL) was administered on T1 and T3 to evaluate behavior.

Results: Out of the initial sample (n=30), 26 children (86%) completed the intervention and follow up assessments. Friedman test was conducted to determine whether BOSCC total score exhibited a reduction between T1, T2 and T3. The results show a significant difference χ²(2) = 15.235, p<.001; with total score means of T1 □=28,8; T2 □=24,8; and T3 □=23,26. A Wileoxon signed-rank test indicated no significant differences in CBCL measures between T1 and T3.
Conclusions: Preliminary data shows promising evidence that the CST intervention may improve social communication skills in children with neurodevelopmental disorders. The fact that most of the families included in the sample could complete the program, demonstrates the feasibility of a remote delivered parent mediated intervention that could help increase the access to early intervention.

403.203 (Poster) Title: Social Communication in Children with Chronic Malnutrition from 2 to 3 Years Old  
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Background:  
The assessment of autism spectrum disorders and social communication deficits in children from a population with chronic malnutrition is a relevant topic in the field of neuropsychology. Its detection would allow to arrive to an early diagnosis and implement interventions that help mitigate the difficulties in the development and well-being of the subjects.  

Objectives: To determine the risk of alteration in social communication and global neurodevelopment in children with chronic malnutrition.  

Methods: A sample of 94 children divided into 2 groups (47 with chronic malnutrition and 47 control group) was assessed. They were compared to a sample of 167 neurotypical children for the pilot study of the ASQ 3 validation in Ecuadorian population. The PRUNAPE, ASQ 3, ASQ SE 2, mChat and communication questionnaires plus ASQ 3 socio-individual area were used for the screening of neurodevelopment and social communication. Data analysis was made using the SSPS software.

Results:  
About 83% of the children presented risk of neurodevelopmental compromise and 25% presented a risk of global developmental delay. It was observed a greater affection in the gross motor area (51%), personal social autonomy (36%) and problem solving (28%), and to a lesser extent, in language (24%).

Conclusions: It was concluded that there was no significant association in social communication or autism in children with chronic malnutrition [χ2(1, n=47) =2.84, p=.09]. Malnourished children aged 2 to 3 years did have a higher risk of neurodevelopmental deficits compared to their neurotypical peers, in relation to their sociodemographic level [χ2(1, N=94) =40.89, p<.01].

403.204 (Poster) Lessons Learned from Adapting and Piloting the World Health Organization’s Caregiver Skills Training Program in Egypt  

Background: Despite progress to raise awareness of the global need for autism awareness and intervention, autism services continue to be inadequate in low- and middle-income countries. Studies in the Middle East and North Africa (MENA) suggest rising autism trends, yet studies in the region report specialist shortages, limited diagnostic tools in Arabic, and lack of culturally relevant interventions.

While the World Health Organization’s Caregivers Skills Training (CST) Program has been successfully adapted and evaluated in other countries with limited resources, the caregiver-mediated program has not been formally adapted and evaluated in the MENA context. A global partnership of autism intervention experts partnered with Egyptian colleagues to culturally adapt, train, and deliver CST to Egyptian caregivers of young autistic children.

Objectives: We will report on the process of adapting, training, and pre-piloting CST, a 12-session manualized intervention focused on child-directed play and engagement, home routines, social communication, positive behavior and emotion regulation, and caregiver well-being. Our presentation will focus on the first two aims of the project: 1) engage key stakeholders in the local implementation of CST; and 2) assess acceptability and feasibility of CST for Egyptian caregivers of autistic children ages 2-9.

Methods: We used mixed methods to carry out our research objectives. To accomplish Aims 1-2, we worked closely with contacts in the Egyptian Ministry of Health to identify and train “Master Trainers” to deliver CST and train and supervise non-specialist facilitators. Master Trainers were recruited if they worked within the public health system in Egypt. For Aim 2, the Master Trainers pre-piloted CST with groups of caregivers in three Egyptian cities (Alexandria, Asyut, and Cairo). Master Trainers collected attendance and demographic data. Our research team is in the process of conducting post-program interviews with groups of Master Trainers and participants.
Results: We trained 18 Egyptian providers on the CST program. Despite challenges associated with the COVID-19 pandemic, 12 Master Trainers delivered the program to five parent groups. The Alexandria, Asyut, and one of the Cairo groups were held in person. Master Trainers delivered two of the Cairo groups remotely. Fifty-two parents joined the program; however, 13 did not attend any sessions. Thus, 39 parents participated in CST across sites. Our research team regularly consulted with Egyptian stakeholders, including local researchers, service providers, and community advocates, on delivery and evaluation methods. We will discuss various challenges we encountered during the training and implementation processes, as well as the ways in which we addressed these obstacles. We will also present findings regarding Master Trainers’ and parents’ perspectives on CST’s acceptability and feasibility, based on data analyses of group interviews.

Conclusions: The “lessons learned” from developing and implementing a caregiver-mediated intervention in Egypt can be useful for informing future research in the MENA region and in other countries affected by limited resources and culturally relevant, family-centered interventions.

403.205 (Poster) Nonlinear, Multi-Element Behaviour Support for Autistic People: Conceptualisation, Assessment, and Intervention That Affirms Person-Centred and Culturally Diverse Practice in Australia

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Background: Conceptualization, assessment, and treatment of behaviors of autism spectrum disorder (ASD) span many disciplines and analytic explanations. Behavioral perspective to understand and treat ASD have largely focused on applied behaviour analysis (ABA) and a linear, operant paradigm. However, the traditional linear ABA paradigm often minimizes or ignores notable contextual variables and valuable outcomes from a person-centered, systematic framework. More importantly, a linear ABA paradigm may include aversive and restrictive practices that are damaging to the person and divisive within the larger autistic community.

Objectives: A nonlinear, multielement framework is an evidence-based ABA paradigm that champions strong clinical goals and ethical standards to improve behaviour and quality of life of autistic individuals in socially meaningful ways. Within Australia, the improvement of quality of life and reduction or elimination of restrictive practice is essential to supporting autistic people. The current presentation defines a nonlinear, multielement behaviour support (MEBS) framework for assessment and intervention for autistic participants within an Australian clinical setting.

Methods: A detailed, single-subject design analysis of assessment, intervention, and outcome was conducted for a sample of 5 representative participants from a larger lifespan sample of 30 cases. The analysis of MEBS procedures emphasized examination of independent variables of functional assessment strategies and proactive nonaversive intervention strategies. Primary dependent variables specified outcomes on episodic severity for behaviors of concern. Cultural variables are also highlighted within the MEBS assessment and intervention plans.

Results: Results support the use of a person-centered, MEBS framework to conceptualize behavioral presentations, reduce behaviors of concern, and improve quality of life.

Conclusions: Implications of these results point to recommendations for the implementation of MEBS, particularly for culturally diverse groups.

403.206 (Poster) Stakeholder Perspectives on Including Children with Autism and Developmental Disabilities in Mainstream School Settings in Ethiopia

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Background:

Services for children with developmental disabilities (DD), including autism and intellectual disabilities, are limited in Ethiopia and a large gap in education provision has been identified (Tilahun et al., 2016), with most children with DD being out of school.

Objectives:
We aimed to explore stakeholder perspectives on ways to meet the education needs of children with DD in the Ethiopian capital city Addis Ababa and to address barriers and facilitators for including them in mainstream primary schools.

Methods:

We conducted 36 in-depth individual interviews and one interactive consultation workshop with caregivers of children with DD, primary school principals and teachers, health and education decision makers (national and local), clinicians, academics and representatives of relevant non-governmental organisations and special education centres. The topic guides focused on priorities and goals to improve education provision for children with DD and the barriers and facilitators to achieve these goals. We used thematic analysis to develop themes deductively, guided by the three dimensions of the Context and Implementation of Complex Interventions framework (Pfadenhauer et al., 2017): Context, Setting, Implementation.

Results:

All stakeholders affirmed the right to education of children with DD, although only a minority promoted inclusive education for all children with DD. Some thought that the latter was an appropriate goal for higher-resourced countries, but not Ethiopia. Many stakeholders suggested that children with mild and moderate DD should access inclusive classes, while special classes and schools are a better fit for those with severe and profound DD. Similarly, caregivers’ preference was typically for inclusive classes if their child’s disability was mild or moderate, and for special schools or units if it was severe or profound. Professional stakeholders reported that this is the model currently in use, though only accessible for a very small minority, while most children remain excluded or on school waiting lists. In the interactive workshop, stakeholders reached a consensus that the intervention goal should be to provide access to mainstream primary schools for children with DD in special units and inclusive classes, depending on individual abilities and needs. They considered it crucial that special units provided opportunities for growth across grade levels, compared to most existing special classes grouping children regardless of progression. According to indirect stakeholder reports, parents of neurotypical children and teachers often oppose the inclusion of children with disabilities in mainstream schools. Stakeholders reported that educating children with disabilities is low on the political agenda, with decision-makers prioritising the allocation of resources for schooling children without disabilities, a proportion of whom are still out of school. Consequently, stakeholders recommended activities to reduce stigma towards children with DD both within schools and in the broader community and advocacy campaigns to promote their education.

Conclusions:

Stakeholders affirmed the need to promote the education of children with DD in Addis Ababa and suggested a mixed model of inclusive and special education based on the complexity of individual needs. Stakeholder recommendations and reports of further barriers and facilitators will inform the development of an intervention for implementing such a model.

403.207  (Poster) Strategies to Support Trust Building for Increasing Diversity of Representation in Autism Research: A Rapid Review

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Background: Autism research has historically excluded equity-deserving groups, especially Indigenous communities, racialized individuals, women, non-verbal communicators, and individuals with lower IQ scores, and continues to grossly lack diversity1. A barrier contributing to the underrepresentation of these groups in research is the lack of trust between many equity-deserving groups and the research community2. However, very little is known about strategies that can promote trust building in the context of research participation. To address this gap, we conducted a rapid review of the literature to characterise existing strategies for trust building with equity-deserving groups, especially focusing on racialized communities.

Objectives: To synthesize strategies that can be implemented to support trust building for increasing recruitment and retention of racially and ethnically minoritized (REM) groups in autism research in Canada and the United States?

Methods: We followed guidelines set out by Cochrane Collaboration for rapid reviews to systematically search and select publications that focus on our research question1. We included peer-reviewed English articles published in Canada and the United States. We extracted findings from eight publications. We grouped similar findings and strategies extracted from these publications to develop three categories (Fig. 1).

Results: The findings from our rapid review suggest that strategies that can support trust building with REM communities for recruitment and retention in autism research can grouped into three broad categories:

1. Partnering with community members throughout the research process (i.e., fostering an interconnected/bi-directional environment) by collaborating with community-academic partnerships, or community-based and/or advocacy organizations.
These partnerships can inform research design, design of research documents and materials (e.g., clear and easy to read consent forms with shorter sentences, bullet points, and visuals), and recruitment of local community leaders to reach REM populations.

2. Recruitment and training of trusted researchers from REM populations who share similar physical and socioeconomic characteristics and experiences.

3. Increasing trust and maintaining relationship at the researcher-participant level by collaborating with individuals’ trusted healthcare provider, sharing study findings in lay terms, ensuring contact from the research team is constructive and friendly, and maintaining a long-term relationship with the community organizations study participants belong to.

**Conclusions:** Our rapid review synthesizes the current knowledge on strategies that can increase trust building with racially and ethnically minoritized groups. Ensuring that research studies are designed to include individuals they claim to support, will result in research findings and services that are relevant to and impactful for a more diverse range of families.

### 403.208 (Poster) Teachers’ Beliefs about Autism Spectrum Disorder in Yemen

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**Background:**

At a time when the world is moving towards integrating autistic youth towards adapting to working life, building a family, and participating in the labor market. Yemen is still facing the problem of accepting autistic children it is a particular need, not a demonic touch. Yemen is considered one of the low-income countries that suffer from poverty, ignorance, and the continuation of the war since 2015. These country conditions generally reflect on the public in Yemen, especially children with disability and special needs.

**Objectives:**

This study has attempted to look beneath the surface of the Yemeni beliefs regarding autistic children. Based on the data collected from 32 teachers (20–30/31–40/≥40 age) in the Taiz district,

**Methods:**

To achieve the aims of this study, The qualitative interview was carried out among 32 teachers recruited and interviewed in two sessions in their schools. A mixed method approach was used to understand Yemeni teachers’ reactions to receiving beliefs towards ASD. The interview time was around 30 to 60 min. A mixed-method system was considered for this study. A semi-structured interview schedule was prepared for the qualitative part, and teachers’ questionnaires were developed for the quantitative part. A thematic analysis approach was adopted, and the interviews were transcribed verbatim and were categorized according to their thematic contents. An Independent rater re-categorized the teachers’ responses, and 95% of consensus between the two independents was reported. Counting and using percentages and frequencies was considered integral to the analysis process in qualitative studies, and numbers were used to establish the significance of findings even with the qualitative method of analysis.

**Results:**

This study found that misconceptions about autistic children were strongly evidenced among teachers who are considered the most educated level in society. Based on the findings, it is argued that since Yemeni teachers had different explanations regarding their beliefs toward ASD, awareness campaigns must be conducted within a cultural context. To increase understanding of parents’ concerns and their need for educational and psychological services in cultures wherever autism is less well-known, undiagnosed, misdiagnosed, or even stigmatized, Studying how ASD is seen differently in different cultural contexts encourages stakeholders like service providers and politicians, to understand and value cultural and personal diversity in the twenty-first century.

**Conclusions:**

Due to personal ignorance and growing superstitions, these teachers tend to believe society’s perceptions of those children, thus resulting in the ignorance of scientific views. However, the mass media can increase this group’s awareness of autistic children by continually assessing the inaccurate statements of those children and correcting them. And by influencing the teachers to take a more conceptual scientific approach in serving their special needs students, informing teachers of children’s rights in everyday life in the future by providing children with an optimal chance of development through early intervention.

### 403.209 (Poster) The Caregiver Skills Training (CST) Program: A Feasibility Randomized Controlled Trial in Canada
Background: The World Health Organization Caregiver Skills Training (CST) Program is a recently developed caregiver mediated intervention that is currently being implemented and evaluated in over 30 countries. CST is a component of the WHO Mental Health Gap Action Program (mHGap), focused on development, implementation, and evaluation of an integrated package of key evidence-based interventions within a collaborating network of community-based services. CST provides evidence-based skills training to caregivers of young children with autism and related neurodevelopmental conditions. In addition to being brief and requiring less specialist time than most evidence informed interventions for autism, CST is also more easily scalable because it uses a cascade training model.

Objectives: We report on preliminary data from an ongoing multisite feasibility randomized controlled trial (RCT) in Canada (Registration ID: ISRCTN58638141). The CST initiative is focused on expanding access to intervention through partnership with five partner sites, who are community-based service providers with established reach for underserved communities.

Methods: We are currently enrolling children suspected or diagnosed with autism aged 2-7 years old and their caregivers in the feasibility RCT. The CST intervention is delivered by Master Trainers who are professionals from partner sites across Canada, trained to deliver CST in a previous phase of the study. The intervention is composed of nine group sessions and three individual “home visits”, all delivered virtually. Because the CST intervention involves group sessions (with 10 caregivers per group), 20 caregiver-child dyads are enrolled per intervention block. Once this recruitment target is reached for each block, the dyad is randomly allocated to either CST or a waitlist control group with a 1:1 ratio, stratified by preferred language (French or English). Primary outcomes are dyadic outcomes related to caregiver-child interactions. Implementation outcomes are assessed as a measure of feasibility (e.g., recruitment, representativeness, adoption and sustainability of the model in the partner sites).

Results: To date, 40 children were enrolled and randomized (71% male; M=5.1 years old; SD=1.5 years old). Recruitment data showed representative distributions across key demographic variables including ethnicity (73% self-reported ethnicity other than White/Caucasian), caregiver education (57% completed Bachelor’s or higher) and household income (65% reported less than $80K CAD annually). Retention rates have been high with 80% of enrolled participants completing post-intervention assessments. Scores on baseline measures were as follows: Social Communication Questionnaire (M=19.1, SD=6.4), Distress Thermometer (M=5.8, SD=2.1), Family Empowerment Scale (total M=10.0, SD=1.8), Strengths & Difficulties Questionnaire (M=17.7, SD=4.9). Qualitative measures with enrolled families indicate acceptability and perceived value of the model.

Conclusions: Although CST has been widely implemented around the world, the model has not yet been tested in rigorous trials. Preliminary analysis suggests that a nationwide trial in Canada is feasible in reaching under-served families, showing promise for its scalability and sustainability as a community-based program. Further analysis will establish the impact of CST on caregiver and child outcomes.

403.210 (Poster) The Influence of Homeland Culture on First-Generation Immigrant Parents Caring for Children with Autism
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Background: The increase in the prevalence of autism to 1 in 44 children born in the U.S. (Maenner et al., 2021) coupled with the nation’s growing immigrant population led to this study’s investigation of the influence of homeland culture on lived experiences of five first-generation immigrant parents caring for children with autism.

Objectives: To investigate the influence of homeland culture on lived experiences of five first-generation immigrant parents caring for children with autism.

Methods: This empirical phenomenological study explored parental decision-making, family roles and responsibilities, and outcome expectations for their children with autism through semi-structured interviews, evidence garnered from participants’ photographs and artifacts, and researcher observations of parents’ interactions with educational and related professional service personnel.

Results: The study’s six findings support and extend academic literature related to the importance of emotional and functional support from homeland associations and intergenerational familial relationships, the repercussions stemming from a lack of homeland experience with disability and autism, and the challenges that participants faced when navigating unfamiliar U.S. systems.

Conclusions: The fact that all five participants from different global regions shared similar perceptions and experienced common challenges in navigating and securing services in different schools for their children with autism highlights the need for attention to the
Background: Autistic people are at high risk of experiencing suicidality. Population-wide studies show that autistic people are up to seven times more likely to die by suicide and six times more likely to attempt suicide than the general population. Autistic women are 13 times more likely than non-autistic women to die by suicide. Numerous barriers prevent autistic people at risk for suicide from getting the support they need, including lack of evidence-based assessment tools.

The Suicide Behaviours Questionnaire – Autism Spectrum Conditions (SBQ-ASC) is a brief self-report suicidality assessment tool in English to identify suicidal thoughts and behaviors in autistic individuals. The SBQ-ASC was developed and validated with and for autistic adults, without co-occurring intellectual disability. Considering the importance of this issue, REAL (Latin American Autism Spectrum Network) undertook the translation and adaptation of the SBQ-ASC into Spanish and Portuguese, as a first step towards having a validated tool to identify suicidality in autistic people in Spanish and Portuguese speaking LAMI countries.

Objectives: To translate and adapt the SBQ-ASC into Spanish and Portuguese following International test commission guidelines for test adaptation, such as:

- Pre-Condition Guidelines: 1. Obtain the necessary permission from the holder of the intellectual property rights relating to the test before carrying out any adaptation. Evaluate that the amount of overlap in the definition and content of the construct measured by the test and the item content in the populations of interest is sufficient for the intended use of the scores. 3. Minimize the influence of any cultural and linguistic differences that are irrelevant to the intended uses of the test in the populations of interest.
- Test Development Guidelines: 1. Ensure that the translation and adaptation processes consider linguistic, psychological, and cultural differences in the intended populations through the choice of experts with relevant expertise. 2. Use appropriate translation designs and procedures to maximize the suitability of the test adaptation in the intended populations. 3. Provide evidence that the test instructions and item content have similar meaning for all intended populations. 4. Provide evidence that the item formats, rating scales, scoring categories, test conventions, modes of administration, and other procedures are suitable for all intended populations.

Methods: 10 mental health professionals and autism researchers plus 14 autistic individuals in different countries such as Argentina, Brazil, Chile, Dominican Republic, Mexico, Spain and Uruguay worked on the translation and adaptation of the SBQ-ASC into Spanish and Portuguese speaking LAMI countries, following International test commission guidelines for test adaptation.

Results: SBQ-ASC was translated into a Portuguese version for Brazil and Spanish versions for Argentina, Chile, Dominican Republic, Mexico, Spain and Uruguay. All versions were culturally adapted.

Conclusions: Suicide in autism is a hidden crisis. It is essential to address and remove barriers to effectively identify autistic people at risk for suicide. Having translated and adapted assessment tools in Spanish and Portuguese speaking LAMI countries is a first step towards the pursuit of future validity studies of evidence-based tools such as the SBQ-ASC, which may allow early identification of suicidal thoughts in autistic people.
Autism knowledge and attitudes have been investigated in predominantly Western countries, while how cultural factors impact understanding of autism in non-Western nations is underexplored. Prior research suggests that autism stigma is higher in non-Western countries and among people with heightened acceptance of inequality and adherence to social norms. Hong Kong has a unique mix of traditional Chinese traditions and influences of Western values. Relative to America, Hong Kong is characterized by a culture where social harmony and hierarchy are more valued, which may suggest heightened negative attitudes towards autistic people. Understanding educators’ knowledge and attitudes towards autism cross-culturally can inform training needs and approaches that work for specific cultures.

Objectives:

(1) Compare knowledge and attitudes towards autism among preservice teachers in Hong Kong and Canada

(2) Evaluate the effect of an online training on autism knowledge and attitudes

Methods:

57 and 55 preservice teachers from Hong Kong and Canada respectively completed a brief, self-paced online training that included research-based information about autism across the lifespan. Pre- and post-training, participants answered questions assessing their knowledge, stigma, and inclusive attitudes towards autistic students (all αs > .75). Post-training, participants completed social dominance orientation (SDO) and social desirability questionnaires. Participants answered open-ended questions, including: “What is autism?” and “How do people in your community/ies treat autistic people?”

Results:

Baseline correlations revealed that autism stigma was negatively associated with knowledge and inclusive attitudes and negatively associated with SDO in both countries (ps < .008). Regressions predicting stigma from knowledge, inclusive attitudes, SDO and social desirability revealed that knowledge was the only predictor of stigma in each country after accounting for other variables (ps < .003).

Although Hongkongers (53%) were more likely to report prior experience educating autistic people than their peers in (Canada 24%; p = .002), they demonstrated lower knowledge and reported higher stigma than Canadian participants (ps < .001), at both pre- and post-test. Despite reduced overall knowledge, Hongkongers were more likely to indicate that autism is caused by new mutations, inherited genetic differences, and environmental factors than Canadians (ps < .05).

Participants in both countries commonly described difficulties in social interaction/communication in their open-ended descriptions of autism (Table 1). Compared to Canadians, Hongkongers were more likely to include misconceptions about autism (e.g. autistic people are antisocial) and less likely to describe autism as a “spectrum.” Hongkongers were also more likely to say community members lack respect for and treat autistic people as “weird” than Canadians (Table 2).

Knowledge, stigma, and attitudes toward inclusion improved with training in both countries (ps <=.001). No interactions between country and training-related changes were observed.

Conclusions:

Participation in a brief online training was associated with reduced stigma and improved knowledge and inclusive attitudes in preservice teachers in Hong Kong and Canada. Autism knowledge emerged as the strongest predictor of stigma across countries. Culturally-specific perspectives on autism may impact how people in particular communities view and treat autistic people. Training should be culturally-adapted to address knowledge domains that are particularly limited in specific cultures.

403.213 (Poster) How Does the Neurodiversity Movement Play out in Non-Western Context? a Critical Review of Hong Kong Autism Research Literature

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Background:

The neurodiversity movement and critical autism studies have challenged dominant assumptions about autism, prompting a re-evaluation of how autism is traditionally studied and understood. However, these movements have grown in the context of Western social development, leaving a gap unaddressed as to whether these paradigms are compatible with non-Western cultures. Hong Kong is unique in...
its rich traditional Chinese culture and influences of Western values. Hong Kong has a relatively vibrant research scene, but it is not known how much the local autism research aligns with the neurodiversity framework.

Objectives:

We conduct a critical narrative review of autism research in Hong Kong and synthesize its state of knowledge. We critically examine the extent to which Hong Kong autism research has been conducted in line with neurodiversity tenets, specifically focusing on (1) how autism is conceptualized, (2) the degree to which autism community participates and contributes to research processes, and (3) how the local community needs are being addressed in research.

Methods:

A search of seven databases for autism-focus empirical research conducted in Hong Kong between 2010 and 2021 yielded 182 English-language peer-reviewed articles. We read the full text and used a pro-forma to extract textual information relevant to the research objectives. We categorized the articles according to the 2018 Interagency Autism Coordinating Committee Strategic Plan and summarized research findings in each category. We used thematic analysis and critical discourse analysis techniques to synthesize themes that describe research practices and procedures that align with neurodiversity or lack thereof.

Results:

The top three autism research areas in Hong Kong were treatments and interventions (N = 53; 29%), biological and cognitive processes (N = 51; 28%), and services and supports (N = 46; 25%). Research topics were generally similar to Western research with some culturally-specific elements (e.g., Chinese language processing, acupuncture, martial arts therapy). Research population was mostly children and adolescents, with only 4% of articles investigating adult issues.

Most articles portrayed autism as a disorder characterized by symptoms described in the diagnostic criteria, while only few studies challenged this deficit-oriented framework. The local autism community’s involvement in the research process was primarily restricted to participating in data collection and intervention procedures, while only occasional feedback was collected from stakeholders to inform research designs. Research approaches adapted for the needs and wants of autistic individuals were limited, while autistic input into research was absent. The most common cultural adaptations involved translation of research materials into Chinese, while only few described specific strategies to make their research more relevant and accessible to the local community.

Conclusions:

The autism research landscape in Hong Kong is dominated by deficit-oriented biomedical and intervention research and lacks diverse autistic representations and community participatory input, a pattern reminiscent of the West in the past. No signs of growth in research advancing the contemporary neurodiversity agendas are observed. Potential barriers of applying the neurodiversity paradigm in Hong Kong may be attributed to the city’s culture of low acceptance of diversity and the broader socio-political pressure on democratic movements.

403.214 (Poster) Toilet Training Autistic Children in Malaysia and Morocco, a Qualitative Study.

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Background:

Toilet training is often challenging for autistic children. Independent toileting is an essential daily living skill and increases autonomy, which is of utmost importance for autistic children. A toilet training protocol developed in the United States (Azrin & Foxx, 1971) has been adapted and studied extensively. However, it has been minimally studied in low-resource areas, minority groups, or other cultures. A recent review (in prep) showed that, despite several adaptations, no specific cultural adaptations have been studied and described thus far.

Objectives:

The current project aimed to study which challenges parents encounter when toilet training their autistic children in two developing countries, Morocco, and Malaysia.

Methods:
Seven focus groups (two in Morocco and five in Malaysia) were organized to gain qualitative insight into barriers and opportunities when toilet training autistic children. Each focus group included 4-9 parents of children with autism (or related conditions), in the age range of 2-9 years.

Results:

Themes that emerged were (1) Toilet training methods, including toilet visits, modelling, reinforcement, and punishment; (2) Challenges, including communication, working parents, generalization to outside the home, and defecation; (3) Goals and aims, including diapers, independence, and school; (4) Need for resources, including lack of Malaysian specific information, the need of support (groups), and need of affordable resources (e.g., video).

Conclusions:

There were specific debatable topics, such as using punishment, the need for verbal communication, when to start, and how to continue toilet training (after relapse). Most parents agreed on the necessity of toilet training, amongst other reasons, for school. Parents in the focus groups showed to be inventive and creative in toilet training their children. However, they did report struggling and experiencing a lack of understanding in their environment. Although they took full responsibility, many parents indicated that they wished to have more support, either professional or from peers. Moreover, they missed culture-specific information, provided in local languages.

403.215 (Poster) The Relationship between Mindreading and Autism Traits: A Comparison between Malaysia and the UK

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Background:

Autism is characterised by persistent and pervasive difficulties in social communication and interaction. However, what is considered appropriate social behaviour varies between different cultures; e.g., eye contact during conversation is considered inappropriate in Asia whereas eye contact indicates attentiveness during conversation in Western countries.

Social difficulties in autism are suggested to result partly from a divergence in the development of Theory of Mind (ToM). Divergent ToM in autistic individuals seems to be universal, it is yet unclear whether there are pre-existing cultural differences in baseline ToM in the general population. Members of the Malaysian general population score higher on the Autism Spectrum Quotient (AQ), including on the social skills and communication subscales, compared to the UK. Whilst these findings could reflect cultural biases in the questionnaire, it could also indicate cultural differences in ToM. This contrasts with previous research suggesting collectivistic countries, such as Malaysia, could potentially have better ToM than individualistic countries.

Objectives:

We investigated potential differences in ToM between Malaysians and British general population samples, and whether these influenced differences on the AQ. Given the contradiction in previous literature, two opposing hypotheses were proposed. If differences on the AQ reflect underlying differences in ToM, Malaysians were expected to score higher on the AQ and perform worse on the ToM tasks compared to British participants (hypothesis A). However, if Malaysians were more collectivistic, and collectivism leads to greater ToM abilities, Malaysians would perform better than British participants on ToM tasks (hypothesis B).

Methods:

120 Malaysian (99 females and 21 males, aged 18-29) and 121 British (88 females and 33 males, aged 18-70) participants completed two classic measures of ToM; the Reading the Mind in the Eyes Task (RMET) and the Strange Stories Task (SST). We administered the AQ, and two measures of cultural orientation; the Cultural Orientation Scale (COS) and the Adherence to Asian Values Scale (AVS). To supplement our cross-cultural comparisons, mediation analyses were performed to study the interrelation between these measures.

Results:

Direct country comparisons showed that Malaysians scored higher than British participants on the AQ, individualism and the AVS, but there were no differences in collectivism or ToM tasks. Correlational analyses showed that the RMET was significantly negatively correlated with the AQ and the AVS. The SST was significantly negatively correlated with the AVS. Three mediation analysis were done to test the influence of collectivism, individualism and AVS on the AQ, mediated by ToM tasks. Although the effect of individualism and collectivism on the AQ was not mediated by ToM tasks, the relationship between the AVS and the AQ was partially mediated by the RMET. Both collectivism and the AVS predicted AQ scores.
Conclusions:

We found cross-cultural differences on the AQ which were partly explained by cultural values. The findings for ToM were more nuanced; adherence to specific Asian values, rather than a traditional cultural orientation paradigm, may better capture cultural differences between the two countries, and might influence ToM and in turn might explain differences in AQ scores between the UK and Malaysia.

403.216 (Poster) Assessing Empathy in Adults: A Malay Language Validation of the Empathy Quotient (EQ)
S. W. Wo and M. H. Yong; (1)Sunway University, Subang Jaya, Malaysia, (2)Bradfold University, Bradfold, United Kingdom

Background: Empathy is defined as an intricate set of cognitive and affective processes that generates individuals’ capability to understand and respond to other people’s mental states. One of the main characteristics of autism is impairment in social functioning and communication and therefore autistic individual often have difficulty in reading social cues. However, this does not necessarily means that they are lack of empathy. The Empathy Quotient is a 40-items questionnaire developed by Baron-Cohen and Wheelwright (2004) which is able to identify sex and group differences in both general population and in clinical groups such as Autism Spectrum Disorders (ASD).

Objectives: To translate and validate the Malay version of the EQ-40 among Malaysian adults.

Methods: An expert panel of two psychologists, an applied behavioural analysis therapist and two parents of adult with ASD to assess the face validity of M-EQ. All five found that all 40 items were direct, specific and easy to understand, except for item 32. The item was then revised. Then, we recruited 354 participants aged between 18 to 53 years (Mage = 26.3, SD = 6.7) to complete the M-EQ and brief Interpersonal Reactivity Index (IRI) in Malay to assess convergent validity.

Results: Our exploratory factor analysis results showed that the M-EQ had three factors: cognitive empathy, emotional empathy, and social skills, which was aligned with the original EQ. In addition, results showed good convergent validity with M-B-IRI. The M-EQ also showed good internal consistency (Cronbach’s α value=0.864) and test-retest reliability. Our findings also showed that females scored higher on M-EQ, similar to past studies.

Conclusions: This shows that the M-EQ is valid and reliable for the present Malaysian sample. Further study should assess the confirmatory factor analysis and compare EQ-40 with adults with ASD.

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Background: The Malaysian Ministry of Education aspires to have 75% of participants of children with special needs education (SEN) in mainstream classroom in 2025. To create an inclusive and learning-friendly environment, “Zero Reject Policy” was implemented in January 2019. However, when movement of control (MCO) was implemented to combat covid-19 pandemic back in March 2020, schools were shut down multiple times. As a result, there were significant challenges to SEN children in particularly autistic children when routines and learning activities were disruptive and children has to learn from online platform. While the educators are making a significant effort to develop effective online learning approaches for special needs children, the engagement of these children and pursue inclusion are unknown.

Objectives: To explore the experience of schooling during Covid-19 pandemic among autistic children and the impact of inclusion in Malaysia.

Methods: In-depth interviews were conducted with 16 families of children with Autism Spectrum Disorder via Zoom. The children aged from 6-18 years old who have attended school at least 6 months before MCO. Data were transcribed verbatim and thematically analyzed using the descriptive phenomenology approach.

Results: The experience of schooling can be divided into two timeframes: “the beginning of MCO” and “after MCO was lifted and future plan”. Most parents reported that younger autistic children experienced meltdown due to the sudden changed of routine. The younger autistic children were unable to learn effectively in online class and parents struggled to guide their children to complete homework assigned by teachers via online platform (eg. Google drive) or communication tools (eg. Whatsapp). Most parents also reported that they are worry on their children’s physical and mental health due to the drastic increased use of electronic gadget (eg. iPad). Some parents also stopped schooling due to the fear of infectious covid-19 virus. On the other hand, most parents reported that their older autistic children were benefited from online learning. Autistic adolescents who have higher self-awareness on their physical appearance and academic performance were more comfortable communicate with their peers virtually and to learn at their own pace. Due to the disruption on school/ academic progress, the parents are uncertain on their children education plans. The parents also unaware about zero reject policy or unsure how this policy would benefit their autistic children.
Conclusions: The study provides an insight into the perceptions of parents supporting an autistic child through a unique time for schooling in Malaysia. While younger autistic children struggle to learn at home with untrained parents and limited resources at home during the pandemic, online learning created a unique and improved approaches for autism teenagers. The parents' heterogeneity view emphasizes the importance of engaging with the autism community to inform policy and practice, particularly in inclusive education that aligned with Malaysia Education Blueprint 2013-2025.

Panels Discussion — INTERVENTIONS - NON-PHARMACOLOGIC - PRESCHOOL & INFANT

217 - Current Directions and Diverse Perspectives on Pre-Diagnostic Supports, Begun Very Early in Life, for Infants More Likely to be Autistic

Panel Chair: Kristelle Hudry, La Trobe University, Melbourne, VIC, AUSTRALIA

Discussant: Kristelle Hudry, La Trobe University, Melbourne, VIC, AUSTRALIA

Early intervention seeks to minimise disability potentially associated with autism. Most early supports are targeted post diagnosis. However, supports offered very early in life—sometimes called pre-emptive or prodromal interventions—may be begun well before diagnosis, when autism likelihood is first recognised; when infants have a known family history of autism/related conditions, or when signs of possible autism are identified. This is a highly topical and potentially divisive topic, and our panel brings together groups working independently and collaboratively across multiple countries/regions, drawing on different disciplinary backgrounds/methodologies, and at different stages in the evaluation cycle. Our objective is to showcase a range of contemporary projects, consider diverse perspectives, and stimulate productive respectful discussion. Individual presentations will consider: 1) proof-of-concept evidence for a new 8-session program occurring between ages 10- and 12-months; 2) health-economic analysis of an established 10-session program recently trialled with community-ascertained infants showing early signs of autism around age 12-months and followed up to 3-years; 3) thematic analysis of experiences shared by Brazilian Portuguese-speaking caregivers on this same established program translated for novel case-series evaluation in a culturally/linguistically diverse context; and 4) mixed-methods research seeking autistic- and autism-community views on the acceptability of very early life autism supports.

217.001 (Panel Discussion) Pilot Randomized Controlled Trial of an Embodied Infant Intervention Approach (Infant Achievements) Shows Promise of Efficacy for Social Communication Outcomes

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Background: Social communication delays are early indicators of autism. High quality early interventions, prior to age 3, can improve developmental trajectories for children with early social communication delays. Infancy, a formative period of neurodevelopment, may be a period of particular malleability to tailored supports. Yet much remains to be learned about potent ingredients of infant interventions, accelerators of caregiver fidelity attainment, and malleability of critical aspects of infant social communication in infants with such delays. We conducted a proof-of-concept study to preliminarily examine efficacy of an infant intervention (Infant Achievements [IA]) that paired two hypothesized active ingredients: selected naturalistic developmental behavioral intervention strategies and multi-affordance objects to elicit caregivers' and infants' joint engagement and facilitate caregivers' developmentally-appropriate communication behavior.

Objectives: Determine whether: (1) caregivers randomized to receive coaching in implementation of IA demonstrate superior fidelity of IA implementation outcomes compared to caregivers receiving unrelated caregiver education (CE) without coaching; and (2) infants with social communication delays in the IA group demonstrate superior social-communication outcomes compared to those in the CE group.

Methods: Caregivers and their infant with social communication delay were assigned to the IA (n=17; MAge=10.8, SDAge=2.2) or CE (n=16; MAge=9.3, SDAge=1.2) group. IA caregivers received eight weeks (16 sessions) of home-based in-person coaching in Naturalistic Developmental Behavioral Intervention (NDBI) strategies to target infant social communication development. The collaborative, evidence-based, Practice-Based Coaching (Snyder et al., 2022) approach was used, encouraging caregiver reflection and supporting video review of caregiver implementation and child behavior each session with the coach. The CE group received weekly interactive education about child development in-person along with weekly phone check-ins for 8 weeks. Caregiver fidelity, infant duration of joint engagement (adapted for infants from Adamson et al., 2020), and child frequency of initiation of joint attention bids were coded at pre- and post-intervention, and at follow-up (8 weeks post-intervention) from 7-minute video-recorded samples of caregiver-infant play. Caregiver fidelity was also assessed bi-weekly. Coding was done by staff blinded to group and time of assessment. See Table 1 for data at each datapoint.
Results: Gains in the IA caregivers’ fidelity of implementation was superior to that of CE caregivers at all datapoints (all $p$s < 0.03, all $g$s > 0.40), except at follow-up ($\beta=5.4$, $p=0.15$). IA infants’ gains in duration of coordinated joint engagement with caregivers ($\beta=36.8$, $p=0.046$) and initiation of joint attention (IJA) bids via triadic gaze shifts ($\beta=5.7$, $p=0.01$) were superior to the CE infants’ from pre- to post-intervention. IA treatment effects on infant outcomes at follow-up were attenuated.

Conclusions: Results supported our hypothesis that this innovative pairing of potent NDBI strategies and objects with development- and engagement-facilitating affordances would kickstart caregiver fidelity of implementation and infant social communication gains. In a post-intervention focus group, IA caregivers reported that IA inspired their self-efficacy regarding caring for their infant with social communication delays; they attributed their infants’ positive outcomes to their use of the IA strategies and strategically selected objects. Results also highlight the need for ongoing caregiver coaching as infants’ social and communication development advances.

217.002 (Panel Discussion) Economic Evaluation of Ibasis-Vipp Vs. Services As Usual in Australia, for Infants Showing Early Signs of Autism

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Background: Markedly increased rates of autism diagnosis place current global prevalence estimates between 1.2-2% (Chiarotti & Venerosi, 2020) and in Australia, over half of all child-aged participants accessing disability-related supports through the National Disability Insurance Scheme (NDIS) have a primary registered diagnosis of autism. The nature and cost of disability-related supports for autism varies by age and disability level, with childhood supports largely related to fostering early skill acquisition and minimising environmental barriers, while later-life supports aim toward independent living (Lavelle et al., 2014). Knapp et al. (2009) have estimated lifetime autism support costs around US$1.4 million in the US and £0.8 million (~US$1 million) in the UK, increasing to US$2.4 million and £1.2 million (~US$1.5 million) respectively, with co-occurring intellectual disability. A challenge for healthcare policy is how best to apportion finite funds to support those with disability and their families.

Objectives: This research extends a decade-long research program begun in the UK (Green et al., 2015; 2017) and recently expanded in Australia (Whitehouse et al. 2019; 2021) showing the efficacy of iBASIS-VIPP to support the development of infants with possible emerging autism. Among 103 infants with early signs of autism around the first birthday (range 9-14 months)—half of whom received 10 iBASIS-VIPP parent-mediated intervention sessions over 5-months—followed up to age 3-years, Whitehouse et al. (2021) reported reduction in the rate of children meeting ASD criteria in the iBASIS-VIPP (6.7%) vs. services as usual (SAU) group (20.5%; OR=0.18 [95%CI 0.0-0.68] $p=.02$; number needed to treat=7.2). Here, we asked whether iBASS-VIPP represents good value societal investment, taking a 3rd party payer perspective to model the net cost impact for government.

Methods: Drawing on data for the 89 infants retained to 3-year follow-up by Whitehouse et al. (2021), we appraised the economic performance of iBASIS-VIPP vs. SAU using cost-minimisation and cost-effectiveness approaches, and modelling outcomes observed at age 3 years and projected downstream costs to age 13. Diagnostic outcome decisions of ASD and Developmental Delay determined at 3 years were used to project diagnostic trajectory and associated disability support costs.

Results: Per child, the estimated mean differential support cost (iBASIS-VIPP - SAU) was AU$5,131, downstream cost saving was AU$13,655, and NPV cost saving was AU$7,335 (discounted 3%pa). Each dollar invested in iBASIS-VIPP yielded an estimated AU$2.66 saving, with ‘break-even’ cost achieved at age 8 years. Modelled to age 13, there was an 85% chance that iBASIS-VIPP would be cost saving.

Conclusions: Modelling outcomes to age 13 with a conservative approach to estimated cost savings (i.e., covering 3rd party-payer costs only), iBASIS-VIPP likely represents good-value societal investment. As a key driver of disability-related support costs sought by families for children in Australia, there is clear policy relevance of offering effective support for infants showing signs of possible emerging autism very early in life, well before diagnosis is confirmed. That this, the benefits for child developmental outcomes achieved through iBASIS-VIPP (Whitehouse et al., 2021) were at an expected net cost saving to government.

217.003 (Panel Discussion) A Qualitative Exploration of Parental Experiences of Receiving a Translated, Western, Evidence-Based Therapy for Infants with Elevated Likelihood for Autism and ADHD in a Non-English-Speaking, Low/Middle-Income Country

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Background: Infants with a first-degree family member with a diagnosis of autism or attention-deficit/hyperactivity disorder (ADHD) are more likely to meet diagnostic criteria for the same condition later in childhood. Prospective longitudinal studies of these infants indicate that differences in social-communication can be seen from as early as the first year of life. Differences in dyadic social-communication during day-to-day interactions between these infants and their parents have also been found. The parent-mediated iBASIS-VIPP therapy (e.g., Green et al., 2015) was developed based on these findings; targeting parental behaviour to enrich the early socio-communicative
environment of the infant and support any early-appearing differences in infant development and parent-infant interaction. iBASIS-VIPP has shown efficacy in improving early social-communication abilities and parent-infant interaction in infants with family history of autism (Green et al., 2015), but has not yet been evaluated for infants with family history of ADHD, nor in non-English-speaking lower resource contexts.

Objectives: To explore experiences of receiving the iBASIS-VIPP therapy amongst mothers of infants with and without family history of autism and ADHD in Brazil.

Methods: This qualitative study involved delivery of iBASIS-VIPP to a case-series of 8 mother-infant dyads resident in Brazil, by four trained therapists. Therapy was delivered in Brazilian Portuguese in online format during March-July 2022. Infants were aged 6-13 months at the beginning of the therapy. Two of the infants had an autistic older sibling, two had an older sibling with ADHD, three had neurotypical older siblings, and one had no older siblings but showed delays in communication development. At the end of therapy, all mothers completed a structured interview in which the therapist asked about their perceptions and experiences of receiving iBASIS-VIPP. Interviews were transcribed verbatim and analysed thematically by one researcher fluent in Brazilian Portuguese.

Results: All mothers reported positive feelings about taking part in the therapy, stating that it was a novel experience during which they felt welcomed, cared for and supported in reflecting on their baby’s development and their interactions and relationship with the baby (Theme 1). Mothers also noted positive changes in themselves and their babies which they attributed to the iBASIS-VIPP therapy (Theme 2). Perceived changes in the mothers included deeper understanding of their baby’s needs, emotions and interests, and improved ability to understand and respond sensitively to their infant’s communication signals. Perceived changes in the infants included improved communication development, increased happiness and security and lower frustration. All mothers also reported that their connection with their baby strengthened and that their day-to-day interactions became more synchronous, empathic and respectful. Finally, the mothers noted that the practical aspects of the therapy were feasible (Theme 3), particularly the fortnightly session frequency, online delivery, and daily home practice.

Conclusions: The Brazilian mothers in this study reported positive experiences of the iBASIS-VIPP therapy and improvements consistent with the therapy targets. While further work is needed with a larger and more diverse sample, the current findings suggest iBASIS-VIPP is appropriate and feasible for implementation in Brazil.

217.004 (Panel Discussion) Autistic and Autism Communities’ Perspectives on Providing Supports to Infants and Their Families Very Early in Life
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Background: Parenting supports provided early in life are intended to support all children to lead happy, healthy lives. Research examining the efficacy of supports provided to parents of infants more likely to be autistic (i.e., because they have an autistic or neurodivergent family member or show early signs of neurodivergence) provides emerging evidence of benefit for parents and infants. While well-founded in developmental science, ‘pre-emptive’ approaches to autism intervention are topical and potentially highly polarising with critical questions regarding the perceived appropriateness of these supports yet to be examined.

Objectives: Within the context of a larger study which sought to understand autistic and autism communities’ views on providing supports to families very early in life - this presentation will examine similarities and differences in perspectives reported by autistic and non-autistic members of the autism community.

Methods: We utilised a mixed-methods, participatory research design, including an online survey and in-depth individual interviews. Autistic adults and parents were actively engaged in the research process and provided equal input into the design and conduct of the project, including the development of survey/interview questions, conducting interviews, and interpreting data. To date, 187 participants have completed (and 78 partially completed) the online survey, including 153 autistic and 112 non-autistic adults representing parents, researchers, and health/education professionals (see Table 1). Twenty-eight in-depth individual interviews have been conducted with thematic analysis to be presented alongside survey findings.

Results: The responses most frequently endorsed by autistic and non-autistic participants are presented in Table 2. Findings indicate broad similarities, with both autistic and non-autistic adults agreeing that the aim of supports for infants more likely to be autistic should be to help parents understand and respond to infants’ feelings, needs and behaviours, and to improve infant quality of life. Autistic and non-autistic adults also agreed that the delivery of supports be adapted for infant and family needs, involve parents supporting infants, include educating parents about autism, and creating opportunities for infants to have choice and control.
Autistic adults were more likely to indicate that supports involve autistic adults working with parents, changing the environment to meet an infant’s needs, and activities that an infant is interested in (whether or not these are usual for neurotypical infants). Non-autistic adults were more likely to report that professionals should work directly with parents, promote positive interactions between parents and infants, and create natural teaching opportunities within daily routine and interactions.

Both autistic and non-autistic adults indicated that the terms ‘support’ and ‘early in life’ were preferable over terminology including ‘at-risk’, ‘pre-emptive’, ‘preventatively’ and ‘prodromally’.

Conclusions: Broad similarities were evident in the perspectives of autistic and non-autistic members of the autism community, particularly regarding the aims and delivery of early supports, with more differences in the specific techniques and approaches thought to be appropriate. Engaging with stakeholders as equal partners is essential to ensure that supports developed are consistent with the needs of the community, and able to reach those they intend to benefit.

**ORAL SESSION — INTERVENTIONS - NON-PHARMACOLOGIC - PRESCHOOL & INFANT**

**316 - Predictors & Outcomes in Early Autism Intervention**

**Moderator:** Tony Charman, *King's College London, London, UNITED KINGDOM*

**316.001 (Oral) Early Developmental Trajectories in Response to Early Start Denver Model: Effects of Treatment Type and Intensity in Community Settings.**

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**Background:**

Early intervention is thought to be key to facilitating more positive later-life outcomes for autistic children. Among early interventions, different evidence-based approaches have combined the principles of behavioral analysis and developmental science within a naturalistic and interactive frame and grouped under the umbrella of Naturalistic Developmental Behavioral Interventions (NDBI). In the context of NDBIs, the Early Start Denver Model (ESDM) is a manualized intervention that reported repeated evidence of efficacy for therapist-, group- and caregiver-implemented interventions, in multiple research and community based settings. Understanding the effects of intervention characteristics and intensity on individual outcomes has a major impact on the delivery systems organization and policies, sustainability in low resources communities and to provide the necessary support to the family. However, a direct comparison among different types and intensity of early interventions in community setting and relatively low access to standardized and intensive programs, have not been adequately explored.

**Objectives:**

We aimed to investigate, in a community setting in the Italian context, the impact of two different treatment types and treatment intensity on individual developmental trajectories.

**Methods:**

A total sample of n=105 young children with autism, aged between 17 and 42 months, both males and females (19% females) were evaluated longitudinally throughout the course of high or low intensity ESDM (ESDM-higher, n=29; ESDM-lower, n=18) or an as usual treatment (TAU, n=58) program, implemented in the context of the autism territory service of Catania.

The ESDM was delivered at two different low intensities such as 3- versus 6 hours a week (ESDM-higher and ESDM-lower, respectively), while TAU treatment was implemented at 6 hours a week. Children were assessed at treatment start and after 6 months of intervention using the Griffiths Mental Developmental Scale (GMDS) to have a measure of individual trajectories in the different developmental domains.
A linear mixed-effect model (lme4 library in R) was applied and individual developmental gains were estimated by the subject-specific slope obtained from the lmer for modeling on the longitudinal GMDS scores. We operationalized developmental gains in terms of treatment response as the rate of change over time and will refer to this concept from here on as ‘treatment slopes’.

**Results:**

The ESDM-higher group displayed steeper treatment slopes compared to TAU on all the developmental domains (language, personal-social, performance, locomotor and hand-eye coordination; p<.029, .014, .017, .000, .001, respectively). The ESDM-lower group showed treatment slopes comparable to the ESDM-higher group for the language, performance, locomotor and hand-eye coordination domains (p>.05), and significantly higher treatment slopes than the TAU group for language and personal-social developmental domains (p<.005, .002, respectively).

**Conclusions:**

We found that higher intensity of treatment and treatment type (e.g., ESDM) matter for improving developmental outcomes. Interestingly, the ESDM intervention delivered at half of the intensity is associated with significantly better treatment slopes, compared to TAU delivered at a double of intensity in all the developmental domains. These findings have an impact for their clinical translation into low resources settings and countries worldwide, where treatment intensity and standardization of procedures is unfortunately not feasible nor sustainable.

**316.002 (Oral) Modifiable Characteristics That Predict Outcomes in a Community-Based Intervention for Preschoolers with ASD**

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**Background:** Pivotal Response Treatment (PRT) is an evidence-based intervention that targets key aspects of development such as functional communication and social engagement. Early interventions (EIs) for children with ASD such as PRT can ameliorate developmental trajectories and life outcomes of these children. Understanding factors that enhance response to PRT can inform the development of more targeted approaches by identifying behavioural characteristics that are directly modifiable. Research indicates that characteristics such as imitation, appropriate object/toy play, and positive affect can influence outcomes after behavioural EIs. A study using a retrospective design found that appropriate toy play, higher levels of positive affect, and less social avoidance at the start of the intervention predicted expressive language (EL) gains in a PRT-based program for preschoolers with ASD.

**Objectives:** To replicate and extend earlier findings by determining whether prospectively derived PRT responder profiles can be identified based on levels of imitation, appropriate toy play, and positive affect at the start of a PRT-based intervention for preschoolers with ASD.

**Methods:** Data were collected from 108 preschoolers with ASD (75% boys; mean age = 57.6 months, SD = 2.2) participating in a study evaluating a province-wide PRT-based EI program. EL was assessed at pre- and post-intervention using the Vineland-II EL subdomain age-equivalent score. Each participant took part in a video-recorded 10-minute pre-intervention standardized play interaction with a clinician trained in the protocol. Videos were coded by trained coders with good inter-rater reliability (mean kappa = 0.79; ICC= 0.813). Proportions of time that children engaged in imitation, appropriate toy play, and positive affect were coded. A latent profile analysis was used to determine whether these predictors together formed distinct profiles that could predict post-intervention EL gains. Nonverbal cognitive ability was measured using the Cognitive index of the Merrill-Palmer-Revised Scales of Development (n = 71).

**Results:** Examination of fit indices showed that a two-profile model was optimal. One-way ANOVAs indicated that the two profiles significantly differed based on levels of imitation (F(1,106) = 243.4, p<.0001, n² = 0.70), toy play (F(1,106) = 180.3, p<.0001, n² = 0.63) and positive affect (F(1,106) = 47.7, p<.05, n² = 0.04). Profile 1 represented a smaller subgroup of children (38%) who at the start of the intervention presented with lower levels of appropriate play, positive affect, and imitation skills, compared to children in Profile 2. A multilevel modeling analysis indicated that profiles predicted gains in EL following the intervention (β = -0.44, (51) =-2.07, p<0.05), with children in Profile 1 showing lower gains. This effect was no longer significant when nonverbal cognitive ability was added to the model.

**Conclusions:** Pre-intervention levels of children’s positive affect, toy play, and imitation skills influence gains made during PRT-based EI. This is moderated by children’s baseline cognitive abilities, which is not surprising as early cognitive scores are associated with modifiable variables that include imitation and play level. These profiles provide important information regarding who is most likely to benefit most from PRT-based EI. It also identifies key modifiable targets that may “prime” children’s responsiveness to treatment.

**316.003 (Oral) Predictors of Developmental and Adaptive Behavior Outcomes in Response to Two Models of Early Intervention: The Early Start Denver Model and Early Intensive Behavioral Intervention**
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Background: Many young autistic children require support to meet their learning needs. However, the wide heterogeneity within the autism spectrum means that different types of early intervention (EI) may be better suited to different children. Two relatively common EI approaches are the Early Start Denver Model (ESDM), a Naturalistic Developmental Behavioral Intervention, and Early Intensive Behavioral Intervention (EIBI), with outcome studies suggesting each are efficacious in improving children’s cognition and adaptive behavior. However, research on which intervention works best for which children remains limited with little knowledge available to help families and service providers know what type of support may work best for individual children.

Objectives: While we anticipated similar and significant developmental gains following receipt of each type of EI program, our main objective was to understand which baseline child characteristics might be associated with the degree of individual response to intervention—whether prognostically (i.e., irrespective of intervention received) or predictively (i.e., specifically in the context of one or other EI approach).

Methods: Participants comprised two matched groups of preschool-aged autistic children receiving one of two community-based EI approaches - Group-based ESDM (n = 42) delivered in a 1:3-4 staff:child ratio, and an Early Intensive Behavioral Intervention (EIBI) delivered in combination of 1:1 and 1:2 staff:child ratio. Children were administered the Mullen Scales of Early Learning (MSEL) at intake and follow-up one year later, and parents completed the Vinland Adaptive Behavior Scales (VABS) at both times. A battery of eye-tracking tasks was administered at intake to measure sustained attention, preferential social attention, response to joint attention and attention to a playful adult.

Results: Children in both groups made significant and equivalent gains on Developmental Quotient (DQ) scores derived from the MSEL and on the VABS. Regression analyses indicated that attention to a playful adult was predictive of both verbal DQ and adaptive behavior for the cohort overall.Moderation analyses indicated that children with poorer sustained attention receiving the G-ESDM made fewer non-verbal gains, while attention span did not predict outcomes for children receiving EIBI.

Conclusions: Children benefited from both ESDM and EIBI with no clear evidence of superiority for developmental outcomes of one program over another, as delivered in community-based settings. Moreover, children who started either program with more social interest (in a playful adult) made more gains in verbal abilities and functional skills. However, sustained attention only impacted gains on non-verbal abilities at outcome for those receiving the G-ESDM. Our findings suggest that fine-grained measures of learning skills offer promise towards the selection and tailoring of intervention approaches to meet individual children’s learning needs.

316.004 (Oral) Towards Personalization: Identifying Differential Response to Intervention Approaches in Profiles of Minimally Verbal Children with Autism


Background:

Comparing intervention approaches across the spectrum has found few differences (e.g. Rogers, et al., 2021), so moving beyond a one-size-fits-all model is necessary. Characterizations of heterogeneity, a noted barrier to intervention evaluation (e.g. French & Kennedy, 2018), generally group minimally verbal children together (e.g. Tager-Flusberg & Joseph, 2003). Optimizing intervention efficacy requires matching approach with a child’s unique needs.

Objectives:

To examine the differential response of minimally verbal subgroups to intervention approaches.

Methods:

Entry and exit data from two multisite RCTs (n=352) with minimally verbal children age 3-8 and a confirmed autism diagnosis were used. “Minimally verbal” was defined as 30 spontaneous words maximum spoken during a taped play activity. Participants were randomly assigned to DTT or JASPER, delivered regularly over 4-6 months. DTT is a structured, adult-directed approach (Lovaas, 1987). JASPER
(Kasari, et al., 2010; Kasari, et al., 2008) is a Naturalistic Developmental Behavioral Intervention (NDBI, Schreibman, et. al., 2015), that combines behavioral and developmental strategies.

Subgroups

Profiles, previously identified via latent profile analysis with baseline characteristics, are described elsewhere (Pizzano, et al., in preparation; Pizzano & Kasari, INSAR 2021), and in Table 1.

Outcome Variables

Coders blind to timepoint and treatment assignment, at >80% reliability, coded data. Expressive language age equivalent (ELAE) (Mullen Scales of Early Learning (MSEL, Mullen, 1995) & Preschool Language Scales (PLS, Zimmerman, et al., 2011)), was scored from standardized evaluations of receptive and spoken communication. Spontaneous communicative utterances (SCU) were transcribed, coded, and summed from a Language Sample (LS) or parent-child interaction (CCX, Kasari, et al., 2014). Language to share was coded from the Early Social Communication Scales (ESCS; Mundy, et al., 2003), a videotaped assessment.

Analysis

Three-way interactions between profile, timepoint, and treatment group assignment were modeled in R (R Core Team, 2020). Control terms for child chronological age, study site, and study were included in all models.

Results:

Participants

Characteristics are detailed in Table 1, and treatment effect sizes are detailed in Figure 1.

Influence of profile on expressive language improvements in response to treatment

Profile moderated the effect of treatment on ELAE from entry to exit ($\chi^2 = 12.97(2), p=0.002$). Profile 1 significantly improved with DTT, but not JASPER. Profile 2 improved equally with DTT and JASPER. Profile 3 significantly improved with both approaches, but gains with JASPER were significantly greater than with DTT.

The three-way interaction was significant ($\chi^2 = 5.97(2), p=0.050$) in the count model for language to share. Profile 1 significantly improved with DTT but not JASPER. Profile 2 made significant improvements with both DTT and JASPER. Profile 3 significantly improved with JASPER but not with DTT.

The three-way interaction ($\chi^2 = 7.80(2), p=0.020$) was significant for SCU. Profile 1 significantly improved with DTT but not JASPER. Profile 2 significantly improved with JASPER but not DTT, and Profile 3 did not significantly improve with either approach.

Conclusions:

Intervention effects differed by profile and treatment group. DTT consistently improved the expressive language of Profile 1 over JASPER, but JASPER was most beneficial for increasing verbal expression of Profiles 2 and 3.

POSTER SESSION — INTERVENTIONS - NON-PHARMACOLOGIC - PRESCHOOL & INFANT

404 - Interventions - Non-pharmacologic - Preschool & Infant I

404.220 (Poster) A Culturally Adapted Telehealth Intervention for Parents of Autistic Children in China

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Background:
Autism affects at least 4.57 million children worldwide, and 95% of these children lived in low-and-middle-income countries where the access to healthcare and education services are limited. In China, there was and still is a scarcity of professionals who can provide evidence-based treatments. Families of autistic children often experience delays in diagnosis and treatment, and this waiting period could be used for initial parent education and training.

Objectives:

This study focused on translating Parent-mediated Early Start Denver Model into a group-based parent coaching intervention via telehealth. We developed a culturally appropriate telehealth intervention to facilitate families with a newly diagnosed child in mainland China. The study aimed to: (1) culturally adapt P-ESDM using the Ecological Validity Model (EVM) and family-centered capacity-building approach, (2) determine the feasibility of conducting a randomized controlled trial of this telehealth intervention in the Chinese context, (3) explore the effectiveness of this telehealth intervention on both children’s and parents’ outcomes.

Methods:

A randomized controlled trial was conducted with two telehealth conditions: self-directed and web + group therapy. 18 parents in the self-directed group received intervention individually through the online learning platform. 19 parents in the web + group therapy condition navigated the same program with a weekly 1.5-hour group coaching therapy via videoconferencing. Linear Mixed Models were conducted to estimate treatment effects across time and model the longitudinal trajectories of outcomes in both children and parents.

Results:

Five dimensions in the EVM were modified: language, person, content, methods, and context. We developed a 12-week telehealth intervention with sixty-three lectures, seventy-five demonstrations, fifty-three commentary videos, eleven practice manuals, and eleven group agendas. The study presented promising results in recruitment capability, retention, parental adherence and participation. High attendance (92%), high completion (90%), and low drop-out rate (10.5%) were observed in the web + group therapy condition. The results indicate this culturally adapted telehealth intervention effectively improved children’s communication skills and social engagement and alleviated the parenting stress. Specifically, group-based parent coaching via videoconferencing showed greater improvement in children’s quality of life and parents’ anxiety outcome.

Conclusions:

This study highlights the cultural adaptation and intervention implementation, and it may serve as a reference for clinicians to develop culturally appropriate interventions. The preliminary findings in feasibility, implementation, and effectiveness indicate the potential of using videoconferencing to deliver group-based parent coaching across borders.
different words (NDW) used during sessions was the primary child outcome assessed. Reliability of measures and training fidelity were calculated for 33% of sessions and exceeded acceptable standards.

**Results:** Results indicate that caregivers can be taught to deliver EMT with high levels of fidelity and acceptable dosage to their children via telehealth. Functional relations between systematic training and caregiver use of each strategy was demonstrated in all nine dyads. The effects of caregiver's use of EMT on child outcomes varied, with half of the children demonstrating statistically significant increases in NDW when caregivers delivered EMT at-fidelity. Caregivers rated the intervention as highly acceptable and helpful. During interviews, caregivers indicated that the just-in-time model prepared their families for participation in subsequent intensive intervention.

**Conclusions:** A just-in-time telehealth service delivery model is a tenable method for teaching caregivers of children with ASD to implement evidence-based language intervention with their children between diagnosis and later services. There is mixed evidence regarding children’s response to treatment that should be studied. Finally, social validity data indicate that this model is acceptable and may be a valuable resource to families in the gap between diagnosis and enrollment in more intensive services.

404.222 (Poster) Results from Toddler Pre-Emptive Intervention on Reduction of Early Problem Behavior and Increased Communication L. Neely, A. Carnett, K. Cantrell, S. Stegemann and M. Svoboda, (1)Educational Psychology, The University of Texas at San Antonio, San Antonio, TX, (2)Victoria University at Wellington, Wellington, New Zealand, (3)Educational Psychology, University of Texas at San Antonio, San Antonio, TX, (4)Autism Treatment Center, San Antonio, TX, (5)Baylor College of Medicine, San Antonio, TX

**Background:**

Social-communication delays are a core characteristic of autism spectrum disorder. For toddlers at-risk for autism, a delayed communicative repertoire might result in the children utilizing dangerous behavior (e.g., head banging) to communicate needs/emotions. For up to 30% of the population, speech as a communication modality never develops. Pre-emptive interventions during the critical developmental phase where speech should develop (9 mos to 3 yrs) may mitigate development of dangerous behavior and promote-social communication. Researchers have validated teaching of functional communication (FCT) in older populations as an effective intervention to teach communication that is safe and generalizable. FCT might be particularly effective as a pre-emptive intervention during the formidable developmental period of 9-mos to 3-yrs-old. However, to date, there is little research evaluating this technique as a pre-emptive intervention.

**Objectives:**

The researchers conducted the current project within the scope of a larger project investigating pre-emptive interventions at-risk toddlers. The presented project aimed to teach communication to toddlers who were engaging in early dangerous behavior (e.g., head banging).

**Methods:**

A total of 23 at-risk toddlers (aged 12-36 months) have participated in the project to date. Researchers conducted single-case experiments for eight of the participants to evaluate the effects of the intervention on the participants’ communication and early dangerous behavior. For the children who engaged in early dangerous behavior, researchers conducted a functional analysis to identify the communicative function of the behavior. Researchers also conducted communication modality assessments for all participants presenting with severe speech delays. Following identification of the function of the early dangerous behavior and preferred method of communication, researchers implemented FCT with the participant and their caregiver.

**Results:**

Researchers evaluated the results using visual and statistical analysis. Visual analysis of graphical displays is the gold-standard technique using in single-case evaluations. The researchers complimented their visual analysis of the graphical displays with effect size analysis using the Tau-U effect size. Visual analysis of the intervention results indicated immediate and large improvements from baseline to intervention phase for functional communication. The graphs also indicated a large and immediate decrease in dangerous behaviors. Resulting Tau-U effect sizes ranged from 0.85 to 1.0 suggesting large effects across all dependent variables.

**Conclusions:**

Preliminary results support the use of the FCT intervention to treat the early dangerous behavior and teach functional communication. While the researchers did not directly target happiness, the researchers did note increases in indices of happiness correlating with intervention, suggesting the participants enjoyed the intervention.
**404.223 (Poster)** A Social-Competence Group Intervention (SCGI) with a Combination of Didactic Teaching and Practice in Play Contexts for Preschool Children with Autism Spectrum Disorders

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Background:

Children with autistic spectrum disorder (ASD) exhibit deficits in social competence. To date, few intervention programs specifically targeting social competence have been designed for children with ASD under the age of 6 years. Didactic teaching may be an effective approach to improve the social competence of these children. Practice in play contexts can improve preschool children’s motivation and learning and also their ability to generalize such practice to real life. Therefore, we designed a social-competence group intervention (SCGI) with a combination of didactic teaching and practice in play contexts for children with ASD under the age of 6 years.

Objectives:

This study investigated the effectiveness of the SCGI, which included didactic teaching and practice in play contexts, on social competence with a randomized controlled trial design.

Methods:

Children were recruited if they were under 6 years of age and had a diagnosis of ASD without apparent verbal comprehension impairments. Recruited children were randomly assigned into the SCGI and control groups. Children in the SCGI group received 16 group-based sessions. Each session met for 50 minutes once per week and targeted specific social topics (i.e., greeting and encouraging others). Didactic teaching was applied in each session to describe the targeted social behavior, provide meaningful rationales, and analyze small steps in the target behavior. Play activities were designed to rehearse and reinforce the targeted social behaviors in a naturalistic play context. Children in the control group participated in their regular occupational therapy, which did not focus on social competence, during the study period. Two evaluations were scheduled before and after the intervention for the baseline and outcome data collection. In these two evaluations, children’s social competence and adaptive behaviors were assessed with the Observational Social Competence Assessment (OSCA), Social Responsiveness Scale, Second Edition (SRS-2), and Vineland Adaptive Behavior Scales, Third Edition, Chinese version (VABS3-C). Caregivers were asked to fill out the Parenting Stress Index Short Form-Chinese version (PSI/SF-C) to measure their parental stress. Repeated measures analysis of variance (rmANOVA) was applied to analyze the intervention effectiveness.

Results:

A total of 25 children (12 in the SCGI and 13 in the control groups) completed their interventions and assessments. The results of the rmANOVA showed that the SCGI showed significant effects on the social adjustment subdomain of the OSCA, the social cognition, social communication, and total scores of the SRS-2, and the parent–child dysfunctional interaction score of the PSI/SF-C ($\eta^2 = 0.17–0.41$, all $p < 0.05$). However, the intervention effects of the SCGI were not significant on any of the 5 subscale scores of the VABS3-C ($p = 0.06–0.94$).

Conclusions:

This study indicates that the SCGI, with the combination of didactic teaching and practice in play contexts, was effective in improving children’s social competence and reducing caregivers’ parenting stress in children with ASD aged under 6 years. The study results provide evidence of the effectiveness of the SCGI and guidance for clinicians to improve the social competence of preschool children with ASD.

**404.224 (Poster)** Parent-Strategies Among Latino Parents of Children with Down Syndrome Following a Parent-Mediated Social Communication Intervention

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Background: JASPER is a parent-mediated social communication intervention effective in improving social communication outcomes for autistic children (Kasari et al., 2021) but has not been tested in children with other neurodevelopmental disorders like Down syndrome (DS). Additionally, few early intervention studies have focused on recruiting Latinx families despite the important role culture plays in parent-child interactions (Hoff et al., 2019).
Objectives: To explore whether parent level of education and primary language spoken at home are associated with JASPER fidelity before and after treatment among Latinx parents of children with DS. To assess whether parent JASPER fidelity at exit is concurrently associated with child language outcomes and moderated by treatment.

Methods: This was a secondary data analysis of 34 Latinx parent-child dyads randomized into the JASPER-EMT intervention (a blended early intervention designed to support language development) or waitlist control arm. Children’s average chronological age was 41.65 months (SD_{age}=7.40; 44% female). The mean visual receptive age equivalent score was 23.58 months (SD=5.07 months). Most caregivers (88%) were mothers (M_{age} = 39.58 years, SD_{age}= 6.37 years). Forty-one percent of families spoke primarily Spanish at home. Number of different word roots (NDWR), coded from a natural language sample, were used to assess language outcomes (Tager-Flusberg et al., 2009). Two sample t-test were used to compare (1) JASPER fidelity scores at entry between mothers with lower education levels (attended some high school or below) and higher education levels (completed high school or above) and (2) JASPER fidelity scores between mothers who used Spanish vs. English as their primary language at home. ANCOVAs were then used to assess whether (1) treatment predicted exit JASPER fidelity scores, controlling for baseline JASPER fidelity, (2) mother’s level of education predicted JASPER fidelity at exit, controlling for baseline JASPER fidelity and (3) primary language at home predicted JASPER fidelity at exit, controlling for baseline JASPER fidelity. Lastly, negative binomial regressions were used to assess whether (1) JASPER fidelity at exit was associated with NDWR at exit, controlling for entry NDWR and (2) whether the relationship was moderated by treatment.

Results: Mothers with higher education had JASPER fidelity ratings that were, on average, 10% higher at entry compared to parents with less education (35.9% vs. 25.9%, p=.018). Primary language spoken at home was not associated with JASPER fidelity at entry (30% vs. 32.8%, p=.532). There was a significant treatment effect on JASPER fidelity at exit (p<.001) but no significant associations between JASPER fidelity at exit and level of education (p=.122) or primary language spoken at home (p=.992). JASPER fidelity at exit was associated with NDWR at exit, controlling for entry NDWR (p=.03). The relationship between JASPER fidelity at exit and NDWR at exit was moderated by treatment (p=.04). Higher JASPER fidelity was associated with higher NDWR for those in the intervention group.

Conclusions: Regardless of level of education and primary language spoken, parents were able to make notable gains and uptake JASPER strategies. Additionally, this study establishes preliminary evidence that the parent-mediated JASPER intervention is efficacious for Latinx children with DS.

404.225 (Poster) AI-Based Non-Invasive Analysis of Child-Therapist Acoustic Interaction Features in Autism Treatment with Preschool Children in Unconstrained Clinical Contexts: A Feasibility Study

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Background:

Unconstrained clinical contexts challenge the automation and the objective quantification of behavior and interaction pattern analysis to bridge research and clinical practice in Autism Spectrum Conditions (ASC), especially during treatment (MoFitt et al., 2022). Non-invasive systems leveraging Artificial Intelligence (AI) may significantly improve the study of treatment response trajectories and enable Precision Psychology approaches in ASC.

Objectives:

To validate a Deep Learning (DL) system for automatically classifying audio signals from video-recorded sessions of Autism Naturalistic Developmental Behavioral Intervention (NDBI) with preschool children.

We aimed at: (1) identifying the presence of human voice; (2) performing child-therapist diarization, for the analysis of the child-therapist interaction dynamics in unconstrained, noisy clinical contexts, non-invasively and in presence of data scarcity and imbalance.

Methods:

For audio analysis, we trained 2D Convolutional Siamese Neural Network (SNN) with self-attention and dilated convolutions, over a set of Mel-Frequency Cepstral Coefficients (MFCCs) extracted from 1-sec audio segments recorded during Autism NDB Intervention and clinical assessments with preschool children. Feature augmentation and online triplet mining strategies were employed and data were projected to a 128-dimensional embedding space to perform similarity-based classification through Euclidean distance.
The train set comprised N=10249 segments (Nu=2402 unvoiced; Nc=3781 child’s vocalizations; Nt=3149 therapist’s vocalizations;Nm=917 mixed). Classification was evaluated through accuracy, F1-score, sensitivity, specificity, Positive Predictive Value (PPV), and Matthews Correlation Coefficient (MCC), robust to data imbalance.

The model was evaluated on: (1) a test set of N=762 (Nu=172; Nc=392; Nt=149; Nm=49) segments not in the train set sessions; (2) an external robust test set of N=430 (Nu=88; Nc=104; Nt=194; Nm=44) segments involving previously unseen children, therapists, recorded elsewhere by different devices, to evaluate generalization.

We compared our architecture with other Machine Learning (ML) and state-of-the-art DL models, i.e., EfficientNetV7 with transfer learning and fine tuning and a Transformer architecture (Vaswani et al., 2017), by means of Area Under the Curve (AUC) and DeLong test.

Results:

For human voice recognition, the Siamese net model achieved high performance on both the test (AUC=0.963; accuracy=0.890; F1=0.925; sens=0.881; spec=0.919; PPV=0.974; MCC=0.730) and the robust test (AUC=0.974; accuracy=0.944; F1=0.965; sens=0.971; spec=0.841; PPV=0.951; MCC=0.826) sets, with higher specificity and PPV than the state-of-the-art DL methods.

The Siamese net model was also accurate in the child-therapist diarization task, on both the test (AUC=0.950; accuracy=0.869; F1=0.905; sens=0.860; spec=0.893; PPV=0.955; MCC=0.706) and the robust test (AUC=0.911; accuracy=0.829; F1=0.783; sens=0.885; spec=0.799; PPV=0.702; MCC=0.656) sets, significantly outperforming the other methods (p<0.001).

Conclusions:

The feasibility of an accurate audio analysis based on AI in real-world settings is relevant for a translation for clinical intervention in Autism, possibly enabling AI-assisted Precision Psychology.

Current research aims at applying the Deep Learning model on longitudinal clinical data and videos in order to integrate audio features with dyadic interaction features in the predictive analysis of treatment outcome.

AI may represent a valuable resource to provide clinicians precious information for treatment monitoring and optimization in naturalistic clinical contexts.

Adapting and Piloting a Teacher Coaching Model Based on the Who Caregiver Skills Training in Public Preschool Settings in Italy

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Background: In the public preschool education system in Italy, children with ASD are enrolled in regular classes led by a classroom teacher, supported by a special education teacher for part of the time. While this model has the potential to promote inclusion and reduce stigma, little or no access to hands-on teacher training in strategies to promote engagement, communication, cognitive and daily living skills has negative consequences on child learning as well as teacher confidence.

Objectives: To adapt and pre-test a teacher-coaching model based on the Caregiver Skills Training (CST), a naturalistic developmental behavioural open access caregiver-mediated intervention developed by WHO (2022)

Methods: The study consisted of an adaptation phase and pre-pilot implementation phase. In the adaptation phase, clinical psychologists with experience of CST implementation and a WHO CST Team member adapted WHO CST materials to develop an individual coaching model for preschool teachers. All core psychoeducational contents and intervention strategies of CST were included, with the exception of adult self-care and problem-solving skills. The adapted intervention consisted of 4 individual virtual sessions with a standard schedule (Figure 1 and Table 1). Participants of the pilot implementation were 23 preschool teachers of the public education system in a city in Northern Italy (M age 43.35 years, SD = 11.68). 11 were classroom teachers and 12 special education teachers; 60% had attended lecture-style seminars on autism. At treatment endpoint, teachers completed an acceptability and feasibility questionnaire adapted from the WHO CST Monitoring & Evaluation Framework. Teacher competence (knowledge and skills) and self-efficacy were assessed at baseline and endpoint with an adaptation of the WHO Caregiver Knowledge and Skills Test. Endpoint interviews were conducted to explore perceived benefits, barriers and challenges of the coaching model.

Results: 22 (96%) teachers attended at least 3 coaching sessions; all submitted at least 2 practice videos. Acceptability ratings were in the ‘good’ range (≥ 4) across relevance, usefulness, value of the sessions and representativeness of teacher behavior; child behavior was
considered insufficiently representative by 4 (29%) teachers. Feasibility ratings for the coaching sessions were ‘satisfactory’ (> 3) across the following dimensions: prevalence of IT difficulties, low audio-visual quality, distractions and interruptions. 5 (36%) of teachers reported that the child was distracted by the camera, and 2 (14%) reported difficulties sharing the video in between sessions. Paired samples t-tests showed a significant improvement on both competence [pretest, M=48.95, SD=6.50), posttest: M=53.70, SD=5.92; \( t(19) = -3.67 \) (16), \( p=.001 \), and self-efficacy [pretest, M=99.30, SD=6.48), posttest: M=103.94, SD=8.44; \( t(19) = -3.17 \) (16), \( p=.003 \). Thematic analysis of 14 interviews identified several benefits (flexibility of remote sessions; self-reflection facilitated by videofeedback) as well as challenges (child being distracted by camera; lack of observation of peer relationships).

Conclusions: The adapted CST teacher-coaching model was found to be acceptable and feasible in public preschool settings in Italy. The remote coaching sessions were highly acceptable, relevant and perceived as beneficial; however, challenges to implementation were identified. Future studies with a randomized design should address barriers to participation and provide evidence of effectiveness on child and teacher outcomes.

**404.227 (Poster) Age Is Related to Better Outcomes in Young Autistic Children Attending Special Education Preschool: A Follow-up Study**


**Background:**

The impact of age on intervention outcomes among autistic toddlers has been previously examined in different contexts. However, the effect of age on outcomes in various developmental domains among young children receiving special education instruction has not yet been examined.

**Objectives:**

To examine the impact of age on outcomes in autism severity, language, and adaptive skills among autistic children following one year of intensive intervention at special education classes for autistic children.

**Methods:**

Seventy-three autistic children (12 girls) aged 2:10-7:6 years (\( M = 4:10, \ SD = 1:0 \)) were divided according to the cohort’s median age into a younger group (n=35, \( M_{age}=3:11, \ SD=0:7 \)) and an older group (n=38, \( M_{age}=5:7 \ SD=0:7 \)). The groups did not differ in baseline cognition, autism severity, or adaptive skills scores. Participants underwent evaluation at the beginning (T1) and end (T2) of one academic year, including measures of autism severity using the Social Responsiveness Scale (SRS-2), adaptive behavior using the Vineland Adaptive Behavior Scales (VABS), and language assessment using the Goralnik Screening Test for Hebrew. All participants were attending special education classes for autism that were operational 50 hours a week over 6 days. The curriculum included group and individual activities provided by educational and para-medical interdisciplinary professionals, and each child’s intervention program had been customized.

**Results:**

To assess autism severity, a 2x2 (2Age groups x 2Times) MANOVA with repeated measures for Time was conducted for the SRS subdomains, yielding a significant Time x Group interaction [F(4,65)=4.87, \( p=.002, \eta^2=.23 \)]. Specifically, significant interactions were observed for awareness, communication, and motivation subdomain scores, but only the younger group, not the older group, showed decreased SRS subdomain scores over time (Table 1). For outcomes in language abilities, a 2x2 MANOVA with repeated measures for Time was conducted for the Goralnik language subdomains (naming, articulation, comprehension, imitation, expression, and storytelling) scores, revealing a significant Time effect [F(4,42)=23.08, \( p<.001, \eta^2=.69 \)] and a significant Time x Group interaction [F(4,42)=4.33, \( p=.005, \eta^2=.29 \)]. For all language subdomains a significant increase was found from T1 to T2. However, the younger group had a more robust increase in vocabulary and expressive language subdomain scores than the older group. For adaptive skills, a significant Time effect [F(4,64)=9.47, \( p<.001, \eta^2=.38 \)] and a significant Time x Group interaction [F(4,64)=4.48, \( p=.003, \eta^2=.23 \)] were found (2x2 MANOVA). For the VABS communication, DLS, and socialization subdomain scores, only the Time effect was significant, as both groups showed a similar increase from T1 to T2. For the VABS motor subdomain, a significant Time x Group interaction was noted as only the younger group showed an increase from T1 to T2.

**Conclusions:**
Autistic children attending special education classes and receiving intensive intervention showed increased language abilities and adaptive skills among both age ranges. However, only the younger children showed decreased autism severity and a more robust increase in verbal abilities. These findings emphasize the importance of starting intensive intervention as early as possible as a younger age is associated with better outcomes.

### 404.228 (Poster) Blended E-Health for Children at Early Risk (BEAR): Development of the Intervention and Pilot Results.

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Background: The importance of early detection and intervention of autism spectrum disorder (ASD) is widely recognized. Difficulties in early identification and access to early interventions are multifaceted, with barriers related to child, parent, professional and organizational levels. As part of a wider strategy to overcome these barriers, the BEAR (Blended E-health for children at eArly Risk) intervention was developed. This is a relatively short and acceptable home-based early intervention offered to parents with symptomatic high risk infants and toddlers. There might be ASD related concerns regarding the child’s development, but not necessarily a confirmed ASD diagnosis.

Objectives: The aims are to present (1) the BEAR intervention protocol, and (2) results of pilot testing the protocol in a small sample (N=6).

Methods: BEAR is a parent adopted, blended e-health intervention. The global focus is supporting parents to understand their child’s behavior, promoting sensitivity in parents to their child’s needs and to motivate the child to socially engage (e.g. improving joint engagement). During pilot testing, six children completed the intervention. The primary outcome measure is joint engagement measured by the Joint Engagement Rating Inventory (JERI) during videotaped parent-child interaction. Secondary outcome measures include severity of ASD symptoms (BOSCC), parental well-being (PSQ, WEMWBS), parental skills (JERI) and satisfaction with healthcare.

Results: Most children (n=4) improved on total time spent in joint engagement. One child seemed to decrease and another child stayed the same. Looking at severity of ASD symptoms, three children decreased in severity. Two children neither increased nor decreased and one child showed slightly more severe ASD symptoms. Looking at parental skills, most parents improved on following in and symbol highlighting skills. There was hardly any improvement measured on scaffolding. All parents reported improved mental well-being after completing the intervention. As for parental stress (N=4), results varied; two parents experienced reduced parental stress, one did not experience any change and one parent seemed to experience more parental stress. After completing the intervention, parents and the interventionist indicated how satisfied they were with the BEAR intervention. All parents reported satisfaction and improvement on multiple areas (child behaviour, raising their child, understanding child’s behaviour) and would recommend the BEAR intervention to others. Interventionists were more critical on the effect of the training that they provided, but were overall satisfied with the effect on family functioning, child upbringing and parental insight in the behaviour of the child.

Conclusions: Preliminary results are promising, with most parents and children seem to improve after BEAR on multiple levels (joint engagement, parental skills and parental well-being), although some other parents and children seem to decrease. BEAR is a helpful first step in parent's supporting their child’s needs with being actively involved during the whole process. For some children, this intervention will be the influx to follow-up healthcare, whereas for other children BEAR can function as a preventive intervention. Naturally, robust replication and analyses on larger scale is needed. Our next step is testing short-term and six month effects in a cluster-randomized controlled trial (N=88).

### 404.229 (Poster) Brief Virtual Consultation Model of Behavioral Sleep Treatment for Parents with Autistic Preschool Children

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Background: Poor sleep quality and duration have been suggested to affect more than half of autistic preschoolers and have been associated with a greater prevalence of daytime behavioral challenges and increased difficulty with functional skills and communication. It also impacts the sleep quality and duration of parents and families, as well as reducing the time available for other activities, due the time often required to help initiate sleep, manage nighttime awakenings, or being with early-rising children. Parents often engage in activities which unintentionally positively reinforce child behaviors that interfere with sleep schedules (e.g., providing food or drink during the night). Increasing parents’ understanding of positive sleep principles and implementing interventions has the potential to help both the child and their family.

Objectives: This pilot study examined the clinical impact of a pilot brief virtual consultation model to provide behavioral sleep education and intervention to parents of autistic preschoolers. Sleep onset latency (SOL), wake after sleep onset (WASO), and total sleep time (TST) were the main clinical parameters examined.
Methods: Parents of autistic preschool children (n = 26; mean age = 37.3 months) were seen via telehealth for between one and three 60-minute sessions focusing on behavioral sleep education and intervention. Families were referred by psychologists and medical providers, either at their autism evaluation or a medical follow-up appointment. Data regarding sleep schedule were collected at each session and recorded in sleep diaries.

Results: The SOL decreased between session one (mean SOL₁ = 72 minutes) and session two (mean SOL₂ = 32 minutes). For those with nighttime awakenings, WASO decreased between session one (mean WASO₁ = 48 minutes) and session two (mean WASO₂ = 19 minutes). The TST increased from session one (mean TST₁ = 9 hours 56 minutes) to session two (mean TST₂ = 10 hours 26 minutes). In addition, at the first session, 84.6% of parents stayed with their child until they fell asleep and 42.3% of parents put their child to bed in the parent’s room or bed. While the most frequent interventions included improving bedtime routines, fading parental presence, time-based visiting, and putting the child to bed later/when tired, interventions typically had to be tailored to the individual family situation – whether due to particular challenges facing their child or the family’s individual capacity for change – and parents were able to choose which interventions were most appropriate for their family, becoming an active part of the treatment team.

Conclusions: Implementing a brief behavioral sleep intervention, administered via telehealth and including psychoeducation to support future skills and parental choice regarding interventions, appears to be able to reduce the time it takes preschool age autistic children to get to sleep, increase how long they sleep for, and reduce the length of time they are awake for during the night. Further research should explore the impact of this intervention model on the daytime behaviors of autistic preschool-age children and their family’s functioning, as well as the merits of utilizing standardized measurement to identify potential referrals and to gauge improvement.

Results: (1) Child Outcomes after Therapist-Delivered Interventions: Overall, MSEL DQ and VABS ABC were significantly higher (i.e., higher level of skills) at T3 compared to T1. There were no effects for group (i.e., ESDM, G-ESDM, Community Services). All other findings were non-significant. (2) Child Outcomes after Parent Coaching: MSEL DQ was significantly higher at T3 vs T1 and at T2 vs T2 for the No Coaching group. VABS ABC was higher at T3 vs T2 and at T2 vs T1; there was no main effect of group nor interaction of group*time. (3) Parent Outcomes after Parent Coaching: Parents reported significantly higher Clarke-QRS scores (i.e., more parenting stress) at T3 vs T2 and at T3 vs T1; there was no main effect of group nor interaction of group*time. There was a significant time*group interaction, but not main effects, for PSOC, driven by a trend ($p = 0.051$) for the No Coaching group to have lower PSOC scores (i.e., lower parenting sense of competence) at T3 vs. T1. To determine if participation in P-ESDM mediated the association between parenting sense of competence at T1 and T3, a follow-up mediation analysis was performed. The results indicated that the total effect between PSOC scores at T1 and T3 was significant ($B = 0.628$, $p < 0.01$), however the indirect mediating effect was non-significant ($B = -0.024$, $p = 0.582$).

Conclusions: Our findings suggest beneficial effects of early intervention for autistic children and, to a lesser extent, parents.
Background: Autism-specific, parent-mediated intervention for children under age 3 leads to developmental gains. Transferring evidence-based, parent-mediated treatment approaches from research settings to the community has proven challenging. A recent US implementation study using key components for community delivery of the Early Start Denver Model (C-ESDM), including online video lessons and parent coaching, showed promising results in improving parent fidelity to ESDM strategies compared to usual care.

Objectives: To translate and adapt the C-ESDM model, including the Help is in Your Hands (HIIYH) video modules for Spanish-speaking communities and pilot test satisfaction and effectiveness in a group telehealth format.

Methods: During the first year of the COVID-19 pandemic, Spanish-speaking ESDM-trained providers used the HIIYH (www.helpisinyourhands.org) online program with four families whose young children had autism. Parents attended weekly 90-min group online sessions for 16 weeks. Providers shared HIIYH video modules using simultaneous English-to-Spanish translation and adjusted for specific Spanish terminologies and cultural adaptations. This field test informed the language translation and caregivers’ acceptability in a telehealth group-based delivery. A formal English-to-Spanish professional translation of the HIIYH English scripts was conducted with eight new caregivers (four per group). Families’ feedback was used to further adapt the Spanish script. Finally, a consensus technical review was conducted between two ESDM-certified autism specialists. Adaptations will be described. Caregivers’ satisfaction (hospital patient experience Ad-hoc online questionnaire), knowledge acquisition (Ad-hoc online questionnaire of the core knowledge for each HIIYH lesson), child’s autism characteristics (ADOS-2), and developmental level (BSID-III, P-ESDM Curriculum-Checklist) were examined before and after the program through descriptive statistics and paired T-tests. Participants currently include eight caregivers (87.5% mothers) between 30-37 years old (75%). Many had a university degree (50%) and were employed (75%) in a skilled occupation (37.5%). Participating children included eight toddlers with autism (ADOS; $M = 19.13, SD = 3.56$), all male with a mean age of 27 months ($SD = 2.59$). BSID-III scores showed mean cognitive scores in the borderline range ($M = 76.88, SD = 15.34$), and significant language delay ($M = 53.00, SD = 5.55$), at the study entry. The sample will at least double by the time of the INSAR meeting.

Results: Caregivers rated the C-ESDM program using the HIIYH modules as “positive” (33%) to “very-positive” (66%). HIIYH video examples were especially well received as they directly supported caregiver strategy use during daily activities. Participants appreciated the group component and shared experiences. Therapist support during the telehealth session was rated as “very positive.” Caregivers’ knowledge showed a significant improvement ($M_{pre} = 16.63, M_{post} = 18.5, SD = 1.59, t = -2.707, p = 0.03$). Significant child differences involved the BSID-III -language scales ($M_{pre} = 53, M_{post} = 60.5; t = -2.758; p = 0.028$) and on the P-ESDM Curriculum-Checklist ($M_{pre} = 46.75, M_{post} = 68; t = -6.211; p = 0.01$).

Conclusions: The C-ESDM program, including the supported use of HIIYH online modules, shows promising pilot responses for community implementation of group telehealth parent training. The C-ESDM group model could be an important resource for Spanish-speaking community service delivery.

Objectives: This study’s main objective was to evaluate whether a PCIT adaptation for children with ASD and severe language and cognitive delays improves child behavioral and social functioning and reduces parenting stress.

Background: Children with autism spectrum disorder (ASD) frequently present with co-occurring problem behaviors (e.g., noncompliance, aggression, tantrums). Parent-Child Interaction Therapy (PCIT) is an effective caregiver-mediated behavioral intervention for children with ASD, resulting in improvements in child externalizing behavior, parenting skills, parenting stress and core symptoms of ASD (e.g., Parlade et al., 2019). There is limited research regarding the application of PCIT among children with ASD and severe developmental delays. An adapted version of PCIT has been introduced in a handful of case studies (e.g., Lesack et al., 2014). In this adaptation of PCIT, the Child Directed Interaction (CDI) phase is largely consistent with traditional PCIT, as it coaches caregivers to use positive parenting skills to strengthen the caregiver-child relationship by promoting social communication and play skills. Additional considerations for children with ASD (e.g., visual supports) are included. The Parent Directed Interaction (PDI) phase teaches caregivers to use effective commands to address noncompliance. In the modified version of PDI, caregivers deliver “compliance training” in which they are taught to use a three-step sequence based on a least-to-most prompting model (i.e., verbal/gestural, model, physical). The present study expands on previous work by examining the efficacy of this PCIT adaptation in a small sample of children with ASD and significant delays.

Objective: To translate and adapt the C-ESDM model, including the Help is in Your Hands (HIIYH) video modules for Spanish-speaking communities and pilot test satisfaction and effectiveness in a group telehealth format.
Regarding peer review latencies, multiple studies in our sample have been flagged for unexpectedly short latencies. At present, none of the currently coded articles have reported COIs. We included 290 reports identified in the updated Project AIM search. Full texts were searched for terms related to adverse event monitoring and reporting, including “adverse”, “harm”, “side effect”, and “complication”. Acknowledgement and disclosure texts were searched for COI statements, and these were categorized by type (e.g., author developed the intervention, author is affiliated with/employed by a clinical provider). To code latency of peer review, publicly available submission and acceptance dates were extracted for all studies published in journals that publicize such information. Efforts to collect these dates for remaining studies via email to journal editors is ongoing. Once this information is collected, reports will be plotted by latency to identify a cut-off point that characterizes potentially inadequate peer review (e.g., less than 1 week). We will then apply robust variance estimation to examine whether effects from reports with potentially inadequate peer review are significantly larger than effects from reports with longer peer review latencies.

Conclusions: Changes from pre- to post-treatment demonstrate improvements in child disruptive behavior and compliance, and decreases in parenting stress, while changes in core symptoms of ASD were not detected. These findings support the use of a compliance training PCIT adaptation in improving the caregiver-child relationship for more impacted children with ASD and severe developmental delays. Suggestions for when this adaptation may be appropriate will be discussed.

**404.233 (Poster) Conflicts of Interest, Adverse Events, and Inadequate Peer Review: Frequently Ignored Aspects of Study Quality**

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**Methods:**

We included 290 reports identified in the updated Project AIM search. Full texts were searched for terms related to adverse event monitoring and reporting, including “adverse”, “harm”, “side effect”, and “complication”. Acknowledgement and disclosure texts were searched for COI statements, and these were categorized by type (e.g., author developed the intervention, author is affiliated with/employed by a clinical provider). To code latency of peer review, publicly available submission and acceptance dates were extracted for all studies published in journals that publicize such information. Efforts to collect these dates for remaining studies via email to journal editors is ongoing. Once this information is collected, reports will be plotted by latency to identify a cut-off point that characterizes potentially inadequate peer review (e.g., less than 1 week). We will then apply robust variance estimation to examine whether effects from reports with potentially inadequate peer review are significantly larger than effects from reports with longer peer review latencies.

Results:

We have coded approximately 25% of articles published between 2017 and 2022 for adverse event reporting, and have found that 15% mentioned adverse events and 10% reported monitoring procedures. At present, none of the currently coded articles have reported COIs. Regarding peer review latencies, multiple studies in our sample have been flagged for unexpectedly short latencies.
Conclusions:

Despite some positive movement in adverse event monitoring and reporting and conflict of interest disclosure, these ethical aspects of conducting and reporting intervention research findings still appear to be an issue in autism research. In addition, peer review practices in this body of literature suggest additional unethical practices that have yet to be substantively addressed by autism researchers.

404.234 (Poster) Counterfactual Conditions in Studies of Early Childhood Interventions for Autistic Children

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Background:

Systematic reviews and meta-analyses of early childhood interventions for autistic children rarely describe or consider the counterfactual conditions provided to comparison groups in included studies. As such, little is known about the types of counterfactual conditions typically employed in such studies, the frequency with which certain categories of counterfactual conditions are employed, and whether this varies by intervention type (where studies of one category of intervention are more likely to feature an active control than studies of another category of intervention). This matters because estimates of intervention effectiveness are derived from the comparison between the intervention and control groups, and active controls may reduce the potential inflationary effects of performance bias. Thus, choice of counterfactual comparison has the potential to substantially influence estimates of intervention effectiveness in a comprehensive meta-analysis and corresponding clinical recommendations.

Objectives:

1. Describe the categories of counterfactual conditions employed in studies of early childhood interventions for autistic children, the frequency with which they are employed, and whether this varies by intervention type.
2. Determine whether intervention effects systematically vary by counterfactual condition.

Methods:

All comparisons in 290 reports included in the updated Project AIM data set (where some reports featured more than one comparison group) were coded for counterfactual condition. Counterfactual conditions were independently double coded as either business as usual (BAU), alternate intervention (AI), modified intervention (MI), or a sham condition. Interrater agreement was high (Kappa = 0.82). Descriptive statistics were calculated to characterize the frequency of counterfactual categories across the full set of studies and by intervention type. Counterfactual condition coding is currently being integrated into outcome level data sets in preparation for moderator analyses. We will then apply robust variance estimation, specifically using a subgroup correlated effects model, to determine whether effects significantly vary by counterfactual condition category.

Results:

Across 290 reports, there were a total of 317 counterfactual conditions. Of these, 241 (76%) were BAU, 43 (14%) were MI, 19 (6%) were AI, and 14(4%) were sham conditions. Developmental Interventions were exclusively compared to BAU counterfactuals. AI and MI counterfactual conditions were more frequently represented in studies of Behavioral interventions and NDBIs than in studies of other intervention types. Sensory-based interventions and technology-based interventions were the only intervention type that were compared to sham counterfactual conditions. We plan to indicate during the panel presentation whether effect sizes significantly vary by counterfactual condition category.

Conclusions:

The vast majority of counterfactual conditions in early childhood autism intervention literature are BAU. However, more established intervention types, such as behavioral interventions and NDBI, have been more frequently tested against modified or alternative intervention counterfactuals. It is likely that the characteristics of certain types of interventions, including technology-based interventions and sensory-based interventions, permit comparison to a sham counterfactual.
Background:

In the last decade, parent-mediated intervention programs have been increasingly adopted in the autism spectrum disorder (ASD) clinical field. The Cooperative Parent-Mediated Therapy (CPMT) is an individual parent coaching program based on Naturalistic Developmental Behavioral strategies aimed at promoting and leveraging positive parental interactional skills in interactions with their ASD-diagnosed children. The CPMT targets the following selected parental skills: Socio-emotional engagement, Emotional Regulation, Imitation, Ostensive Communication, Communication, Joint Attention, Play and Cognitive Flexibility, and Cooperative Interaction.

Objectives:

The present study evaluated the effect of the CPMT on a sample of 10 dyads including Italian preschool children “at risk” for autism (7 males and 3 females, age from 10 to 36 months) and their parents (either father or mother). Participating children were recruited through and assessed by trained clinicians at the Bambino Gesù Pediatric Hospital in Rome in a pre-therapy diagnostic session with ADOS (Autism Diagnostic Observation Schedule) and ADI-R (Autism Diagnostic Interview-Revised).

Methods:

To compare pre and post intervention interactions of participating dyads, video recordings at two different time points were selected and analysed: before the CPMT intervention (T0) and at 6 months follow ups after the intervention (T1). In both T0 and T1 sessions, parents were asked to play with their children as they usually do at home, using props and objects provided during the therapy, e.g. books and toys for pretend play. A combination of qualitative and quantitative measures was adopted on the video data. First, parent’s behaviors in interaction were coded by using PICCOLO (Checklist Observations Linked to Outcomes, Roggman et al. 2013), a rating scale including four behavioral domains considered as good predictors of positive developmental outcomes for children: Affection, Responsiveness, Encouragement, and Teaching.

Results:

Results from pre and post assessment with PICCOLO were analyzed by using a repeated measures ANOVA comparing data collected before and after the therapy, for each parent-child dyad. Analyses revealed significant improvements in each domain from T0 to T1, with the responsiveness domain having the most significant effect (Affection \( t = -3.881, p_{\text{Tukey}} = 0.047 \); Responsiveness \( t = -6.692, p_{\text{Tukey}} = 0.001 \); Encouragement \( t = -5.250, p_{\text{Tukey}} = 0.008 \); Teaching \( t = -5.014, p_{\text{Tukey}} = 0.010 \)). Then, based on statistical evidence from PICCOLO, focused in depth microanalyses were carried out on RESPONSIVENESS to investigate changes in this domain as a result of the CMPT.

Qualitative analyses were conducted with ELAN (Brugman et al., 2004) on the most significant video-recorded observations, and included vocalization, audio pitch and intensity, action and gaze of caregiver and child. Results showed that responsiveness improved after therapy, especially at the beginning of the interactive episodes. Qualitative, in depth observation of a sub-set of parent child interactions confirmed the increased ability of the parent to follow the child's activities with flexibility after therapy.

Conclusions:

To conclude, this study presents preliminary but sound evidence of the benefits of using CMPT as an early intervention aimed at improving interactional dynamics in families with ASD children, supporting scientific understanding of how these improvements are mutually achieved by parents and children.

404.236 (Poster) Developing a Comprehensive Theory of Change of a Naturalistic Developmental Behavioral Intervention Using an Exploratory Sequential Mixed Methods Design

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Background: Mounting evidence suggests that naturalistic developmental behavioral interventions (NDBIs) support social communication development in young autistic children. NDBIs are increasingly being researched and deployed in community settings. Yet, there is relatively little empirical evidence pertaining to the active ingredients, mechanisms of change, and long-term outcomes of these complex interventions.

Objectives: This study engaged a variety of intervention shareholders, including treatment experts, community providers, and caregivers, to develop a comprehensive theory of change of Project ImPACT, a parent-mediated NDBI.

Methods: We used an exploratory sequential (qual -> quan) mixed methods design. First, shareholders (10 expert trainers, 21 certified providers, and 12 caregivers) completed semi-structured interviews about their experiences with Project ImPACT, in which they described mechanisms of change associated with various components of the intervention as well as short- and long-term outcomes for children and
Developmental Delays in Children with Autism Spectrum Disorder Enrolled in Early Intervention Programs


Background: The presence of developmental delays is considered to be a critical factor affecting outcomes in individuals with Autism Spectrum Disorder (ASD). However, estimates of the co-occurrence of developmental delays in ASD vary greatly, ranging from 10-70% across studies and age-groups (Zeidan et al., 2022). This variability across studies and populations is problematic because it provides limited information on services and supports for different age-groups and populations on the autism spectrum, including young children who enroll in early intervention (EI) programs.

Objectives: The current study examines the presence of developmental delays in a large and well-characterized sample of autistic children enrolled in EI programs.

Methods: Our research question was addressed using baseline data from an aggregate dataset collected for a broader study that includes child-level data for 913 children with ASD (male 82%; aged 13-75 mos., mean = 38; SD = 13) who enrolled in EIs as part of their participation across 15 EI trials. As children from different trials were administered different developmental assessments (including Mullen Scale of Early Learning, Leiter International Performance Scale-3rd edition, Merrill Palmer-Revised Scales of Development, and the Bayley Scales of Infant Development) a common metric was obtain by generating developmental quotient (DQ) scores, calculated through the ratio of developmental and chronological age. Following Manner et al., 2020, we used DQ ≤70 as a proxy for the presence of developmental delays, while children with DQ of 71-85 were classified as being in the borderline range.

Results: Overall 73% of participants had a DQ ≤70, i.e., consistent with the presence of developmental delays at enrollment, with significant variations related to age of intervention enrollment. As illustrated in Figure 1, 57% of children initiating EI at <24 months had a DQ ≤70, whereas that was the case for 68% of those who initiated EI between 24-35 months, 81% of those who were 36-47 months, and 83% of those who were ≥48 months old at intervention start (X²(6) = 44.53, p < .001). There were no statistically significant differences associated with race (X²(4) = 2.14, p = .71).

Conclusion: Our mixed methods approach emphasized practice-based knowledge from community clinicians as well as caregiver perspectives, allowing us to identify change processes which seem important or meaningful to end-users of the intervention and to consider potential change processes which have been overlooked in research to date. Our research pointed to a variety of downstream effects pertaining to quality of life; in many cases, the caregiver-child dyad’s ability to have fun, mutually engaging interactions was the most meaningful intervention outcome reported by caregivers. Consistent with calls from neurodiversity advocates to focus more on outcomes relating to quality of life, social support, and wellbeing, we believe this is an important area for increased study. This study presents with some limitations. Although our sample for qualitative analysis was relatively large, the respondents were not necessarily representative of all consumers of Project ImPACT. In addition, because we used archival data in the quantitative phase of this study, we did not have access to measures that could assess each hypothesized mediator and outcome in an ideal sequence or at the appropriate times for an ideal longitudinal mediation analysis.
Conclusions: Although a diagnosis of intellectual disability requires additional information and might not be established until later in life, and sampling biases might have affected our results, our data suggest that developmental delays are common in children entering early intervention studies. The proportion of children with DQ scores consistent with developmental delays appeared to increase with age at intervention start, pointing to the importance of closely monitoring developmental progression in the population of children accessing EI, and implementing comprehensive supports accordingly.

404.238 (Poster) Do Child Characteristics at Intervention Start Correlate with Positive Reinforcement Situations at Different Times in an Individualized NDBI Approach?

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Background:

Naturalistic developmental behavioural interventions (NDBI), such as the Frankfurt Early Intervention Program A-FFIP, are the treatment method of choice when aiming at improving core ASD symptoms in preschoolers with ASD. It has been discussed that the individual child's characteristics may influence individual applicability of intervention methods. In NDBIs, natural positive reinforcement (PR) are implemented in different ways, such as with non-social, social and combined types of PR (TPRs). To study the individual course of intervention, the amount of change of TPRs and its relation to the child's characteristics at study entry are interesting targets, to exemplify the influence of child's characteristics on the applicability of intervention methods.

Objectives: We explore [1] whether the frequency of different TPRs differs between the first A-FFIP session (T1) and a session approx. six months later (T2). Further, [2] we investigate correlations between the child's characteristics prior to intervention and different TPRs at T1 and T2 and [3] explore if the child's characteristics prior to intervention are correlated with change in TPRs between T1 and T2.

Methods: Data were obtained within the multi-centre, randomised-controlled phase-II trial on the A-FFIP intervention (Kitzerow et al., 2020). Data of N=19 children with ASD, aged M=49 months (SD=11.42) at study entry are presented. For each child, different aspects of PR-situations of T1 and T2 were coded from video (i.e. frequency of PR-situations, TPR [percentage of social, non-social, paired in relation to all PR]). The codings were done by two raters using the OPRIS coding system (inter-rater agreement on the single item level ≥.95). Child characteristics prior to intervention: chronological age (CA), cognitive developmental age (DA; Bayley-III/WPPSI-III), restrictive-repetitive and stereotypic behavior (RBS-R), initiating (IJA) and response to joint attention (RJA; ESCS).

Results:

[1] On the group level, the overall frequency of PR-situations at T1 (M=27, SD=11.9) and T2 (M=31, SD=15.8) did not differ (t(18)=-1.00, p=.33), and no differences were found between TPRs (social: Z=1.15, p=.26; non-social: Z=0.26, p=.80; paired: Z=-1.19, p=.24).

However, on the individual level, change in frequency as well as TPRs was observed (see figure). [2] Small to medium correlations were found between the child’s characteristics prior to intervention and frequency of PR-situations and TPRs in T1 and T2 (see table). [3] Change in frequency of PR-situations and TPR were correlated with CA at study entry (frequency: r=-.48, 95% CI [-.77, -.03]; non-social TPR: r=.30, 95% CI [.18, .66]), DA (social TPR: r=-.33, 95% CI [-.68, -.14]), and IJA (frequency: r=-.44, 95% CI [-.76, -.05]; non-social TPR: r=-.41, 95% CI [-.74, .09], social TPR: r=.34, 95% CI [-.17, .70]).

Conclusions: The results indicate that child characteristics have an impact on the applicability of intervention methods, namely frequency of PR-situations and TPR over the course of the A-FFIP intervention. On an individual level, change in frequency and types of PR were found, which correlated with child characteristics at start of intervention. Planned mediation analyses with a larger sample will provide more insight into the development and possible influences in the future.

404.240 (Poster) EEG Cap Tolerance Training for Parents of Children with Autism: Preliminary Feasibility Study

Background:

Hypersensitivity is common in Autism Spectrum Disorder (ASD), and may interfere with electroencephalogram (EEG) wearable neuroimaging data collection. Differential negative reinforcement of other behavior (DNRO), in which the learner accesses a break from the device, may be an optimal intervention as noncompliance with medical devices may be maintained by access to escape.

Objectives:

The study evaluates preliminary feasibility of DNRO procedures when teaching children to tolerate an EEG head cap.

Methods:

Caregivers of children (2-4 years) enrolled in a study exploring emotion expression were trained to teach their own child to tolerate wearing an EEG cap for 1.5 hours. A fabric cap covering head from inion to nasion on the sagittal axis, and preauricular points on the coronal axis, simulating a full-head EEG cap, was mailed to participant’s homes to practice wearing, prior to clinic appointment. One-hour Behavior Skills Training (BST) training was delivered via Zoom: providing written instructions, modeling, roleplay, feedback on roleplay, and repetition of roleplay until the parent meets mastery criterion. During BST, modeling and roleplay used a doll or stuffed animal. Following completion of BST, the parent practiced DNRO procedures with their own child over Zoom while the instructor observed and provided feedback. Parents were instructed that if the child kept the cap on for a predetermined interval of time (based upon baseline performance), the child could access a 30 second break from the cap and a preferred activity. The instructor recorded the duration of compliance (i.e., seconds or minutes) wearing the cap without attempts to remove or disruptive behavior (e.g., aggression, self-injurious behavior). Generalization data in the clinic setting were collected during the study appointment.

Results:

Of the 20 children who participated in the larger study, 8 completed the BST cap training protocol, and 2 reviewed the mailed materials and received supplemental instruction via phone call (see Figure 1). These 10 participants (50% of larger sample, 100% male, 80% autistic) completed cap training an average of 9 days before the in-person session. Excluded participants (85% typically developing) declined the training as there was no concern of the child not tolerating the EEG cap. Baseline cap tolerance at the training differed among participants (5 children ranged 0 seconds – 6 minutes; 3 children reached >15 minutes). Of those who received training or materials, 70% (n = 7) tolerated the EEG cap for the 1.5-hour session. Three participants were unable to tolerate the EEG cap and did not contribute EEG data. Further, 57% of participants who were trained by their parents to tolerate the cap at home and had a baseline tolerance less than 15 minutes, demonstrated improvements in EEG cap wearing tolerance from baseline to study appointment.

Conclusions:

Preliminary data provide initial evidence that remote BST is successful in teaching parents to implement DNRO procedures with their children. Findings suggest that BST paired with DNRO procedures may facilitate increasing representativeness of study participants by scaffolding tolerance that serves as a requisite for participation. Limitations, variations to implementation, and considerations for future adaptation will be discussed.

404.241 (Poster) Effect of Group Consultation Training Activities on Clinician Adherence to the Project Impact Manual and Parent Coaching Competency

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Background: Clinicians working in lower-resourced settings like the Medicaid system infrequently utilize evidence-based parent coaching interventions and report numerous barriers (e.g., limited training; Straiton et al., 2021). Little is known about the effectiveness of implementation strategies like group consultation at improving clinician fidelity to parent coaching interventions.

Objectives: Identify the “active ingredients” of consultation by examining which training activities (i.e., feedback on taped sessions, role play, case support discussions) are most effective at improving: a) adherence to the Project ImPACT manual, and b) competency in parent coaching.

Methods: Coders analyzed 174 taped Project ImPACT telehealth sessions from 16 ABA clinicians working in five agencies with Medicaid-enrolled autistic youth. Clinicians were provided the manual and completed a 6-hour online tutorial on Project ImPACT prior to meeting with families. During the baseline period (length was randomized by agency from 3 to 9 weeks), clinicians followed the Project ImPACT manual without additional support. During the 12-week consultation period, clinicians met with colleagues and a Project
Background: Caregiver use of "Toy Talk" strategies (e.g., talking about toys and giving objects names) has been shown to increase sentence diversity (Hadley et al., 2017a) and the productivity of tense and agreement morphemes (Hadley et al., 2017b) in typically developing toddlers. In a recent study of toddlers with ASD who were receiving naturalistic developmental behavioral interventions (NDBIs), naturally occurring caregiver Toy Talk was associated with improvement in child lexical diversity beyond the child's initial cognitive and symptom levels (Clark-Whitney et al., 2022). Additionally, the effect of caregiver baseline Toy Talk on children's sentence diversity change was stronger when caregiver NDBI strategy use improved over time. However, the past study was based on data from studies that did not directly target Toy Talk in caregivers. Thus, we combined NDBI and Toy Talk strategies (Hadley & Rispoli, 2015) sequentially in a pilot telehealth intervention incorporating caregiver education and in vivo coaching.

Objectives: (1) Examine whether there are significant changes in child outcomes, defined as child scores on the Brief Observation of Social Communication Change [BOSCC], mean length of utterance (MLU), and the number of unique subject-verb combinations; (2) examine caregiver behaviors, defined as caregiver scores on the Measure of NDBI Strategy Implementation [MONSI] and use of Toy Talk; (3) explore the relation between caregiver behaviors and child outcomes.

Methods: Using a nonconcurrent multiple baseline design, 14 children with ASD between the ages of 2 and 4 years who had at least 50 single words at baseline (3 females; \( M_{age} = 36.9 \) months; \( SD = 8.4 \) months) and their caregivers participated in the study. Language transcripts of caregiver and child utterances were obtained using 12-minute recordings of the BOSCC and analyzed using Systematic Analysis of Language Transcripts (SALT) software. Visual inspection of session data was used to examine changes in child outcomes (i.e., BOSCC scores; MLU; unique subject-verb combinations) as well as caregiver behaviors (i.e., MONSI-CC scores; use of Toy Talk) from baseline to end of treatment and at follow-up. Generalized Linear Mixed Models (GLMM) were performed examining the effect of time on the aforementioned variables while controlling for baseline age, nonverbal IQ, and gender. Finally, correlation analyses were conducted to examine the relation between caregiver behaviors and child outcomes.

Results: Visual inspection of session data indicated variability across individual children and caregivers (Figure 1), although there was a significant effect of time for some outcome variables. Specifically, GLMM revealed significant improvements in child MLU and unique subject-verb combinations as well as caregiver use of Toy Talk and MONSI-CC scores over time. In contrast, time did not have a significant effect on the child's BOSCC scores. Finally, caregiver use of Toy Talk was significantly negatively correlated with child total BOSCC scores \( (r = -.45, p < .001) \), and significantly positively correlated with the number of unique subject-verb combinations children used \( (r = 0.44, p < .001) \).
Conclusions: The pilot telehealth-based NDBI+Toy Talk intervention appears to be a promising approach to increase caregiver use of NDBI strategies and to booster child language development; however, replication in a larger sample is needed.

404.243 (Poster) Effect of a Focused Social and Communication Intervention (SCI) on Preterm Children at Risk for ASD: A Follow-up Study
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Background: Globally, 15 million babies are born prematurely (<37 weeks' gestation) each year. Advances in intensive neonatal care have greatly improved the survival rate of preterm infants. However, the incidence of neurodevelopmental disorders in this group, such as autism, is one of these behavioral conditions observed. There is scarce evidence of programs that monitor the development of this group when the first developmental concerns appear until the diagnosis is finally confirmed and not many studies report follow-up results.

Objectives: To this end, we conducted a pilot focused social-communication intervention aimed to investigate results in broader gains in social, cognitive, language and adaptive functioning in young preterm children with a higher probability to have autism (measured withADOS and M-CHAT-R/F) 6 months after finishing intervention. Moreover, this is the first study to use individual change indices in a pre-post-follow-up design with preterm infants with ASD, a comparison group, and a control group.

Methods: Eighteen children between the ages of 18 and 20 months participated in the study. Children were recruited from a developmental disorder diagnostic and rehabilitation centre and from the Salamanca Clinical Hospital, and allocated to the three groups in accordance with the respective inclusion criteria: (1) preterm children at risk for autism who received intervention (experimental), (2) full-term children at risk for autism who received intervention (comparison), and (3) preterm children (control). In the intervention, children participated in fifteen weekly individualized 2-h session with a researcher that emphasized embedding strategies targeting imitation, joint attention and play into everyday routines and play activities. Children were evaluated 6 months after the end of the intervention.

Results: Findings indicate that children in the intervention groups maintained the improvements showed post-intervention. There were significant differences in imitation skills (.045), joint attention (.031), and play (.025) in the follow-up results compared to post-intervention. There were no significant differences between preterm and term children with autism in any area. Individual analyses showed similar results, except for ADOS-T module results and cognitive functioning, in which the mean of preterm children with autism showed reliable changes maintained 6 months after finishing intervention.

Conclusions: These results shows that change can be made and maintained in core developmental areas for preterm children with a higher probability to develop autism, when applying a low-intensity intervention targeting social and communication skills. Even though such core areas of impairment are not easy to change, the intervention had an appreciable effect. Most of the participants improved significantly in socio-communicative skills, cognitive development, language, and adaptive behavior, and ASD signs were reduced. Thus, this study emphasized the need for further research and implementation of early interventions in young preterm children with autism when targeting social-communication skills as a main objective for intervention.

404.244 (Poster) Effectiveness of Compression Garments and Related Therapies for Children with Sensory Processing Differences: A Rapid Assessment of a Decade of Evidence
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Background: Therapies involving use of compression, touch and weight have become a popular and accessible means to support sensory processing needs in children. However, the mechanism by which these approaches may benefit children with sensory processing differences is yet to be explicated. Further, evidence for the effectiveness of these therapies has yet to be reviewed exclusively in populations of children with sensory differences, and independently of other sensory-based approaches.

Objectives: To synthesize recent research on the effectiveness of compression and related therapies for supporting health and wellbeing among children with sensory processing differences.

Methods: A rapid evidence review was conducted (Grant et al. 2009). CINAHL,ERIC, PsycInfo databases were searched on 02/02/2022 for articles published over the last 10-years, using these search terms: weighted OR pressure OR compressi* OR sensory OR massag* OR Qigong OR therapressure OR Wilbarger OR brush OR sensory diet AND therapy OR intervention OR support OR strategy OR protocol.
Articles were included if the sample population had known sensory processing differences and were aged 4-to-12 years. Unpublished/grey- and non-English-language articles were excluded, as were qualitative analyses.

Results: 5,414 articles were retrieved and 20 articles met inclusion/exclusion criteria. Children on the autism spectrum were the predominant study participants (n=14), followed by attention-deficit/hyperactivity disorder (n=3) and other sensory processing needs (n=3). Studies included participants in pre-school (3-to-5 years; n=8) and primary-school (6-to-9 years; n=12) age ranges. Research designs were a mixture of case studies (n=11), non-randomized- (n=3) and randomized controlled trials (n=6). 17 studies provided evaluation of a single therapy modality: weighted items/garments (n=8), compression garments (n=2), brushing (n=3), massage (n=3), and therapeutic body wraps (n=1). Two evaluated the effects of weighted versus compression garments, and one study evaluated an individualized therapy curriculum that incorporated use of weight and/or compression and/or brushing. Dosage and duration of therapy varied across studies and ranged from 28 minutes spread across four weeks to 3,600 minutes spread across 12 weeks. Multiple outcomes of interest were reported, within and across studies, and these were broadly classified as: sensory reactivity (n=10), diagnostic symptoms (n=10), sleep (n=7), cognition/attention/learning (n=6), general behaviour/global functioning (n=6), behaviour that challenges (n=3), occupational performance (n=3), acceptability/tolerability (n=3), activity/movement (n=1), sensory perception (n=1), health-related quality of life (n=1), salivary oxytocin (n=1), and caregiver stress (n=1). Overall effects were mixed; 13 studies reported positive or mixed results and 8 studies reported no therapeutic benefit. A fine-grained analysis of therapeutic effects differentiated by type of therapy and outcome domain is underway.

Conclusions: Current evidence provides mixed support for use of compression, touch and weight to support health and wellbeing among children with sensory processing differences. However, there was wide variability across studies in therapeutic approach (including dosage and duration) and outcomes of interest, making it difficult to compare effects across studies. Furthermore, the internal validity of most studies was questionable due to small sample size and a lack of blinding and random allocation. Further investigations in large and phenotypically diverse samples is warranted to determine “for what” and “whom” there is therapeutic benefit.

404.245 (Poster) Effects of Ayres Sensory Integration Therapy on Daily Life Activities and Participation of Children with Autism Spectrum Disorder
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Background:

It is known that more than 90% of people with autism spectrum disorder (ASD) have some sensory integration dysfunction (DIS). DIS can lead to difficulties in participating in activities of daily living (ADL), motor performance and learning, as well as emotional and behavioral problems. As a result, Ayres Sensory Integration Therapy (ISA) came to be considered an evidence-based practice for the treatment of autism, with the aim of reducing challenges related to sensory processing, increasing participation and improving occupational performance.

Objectives:

To verify the effects of ISA Therapy on ADL and the participation of Brazilian preschool-age children diagnosed with ASD, based on the analysis of the results of the Pediatric Evaluation of Disability Inventory PEDI.

Methods:

This study is a part of a large study of quasi-experimental methodology, with 9 children with ASD, aged 3 to 6 years, who have sensory integration dysfunction. Recruitment was by convenience sample, according to the waiting list of the Sensory Integration Laboratory (LAIS) at UFMG. Participants underwent an individualized intervention, performed by an occupational therapist certified in sensory integration, twice a week, lasting 50 minutes per session, for 4 months (30 sessions). Participation was voluntary, upon signature of the Free Clarified Term. For the analysis of the outcome measure, PEDI was performed, pre and post-intervention. The PEDI is a standardized instrument that assesses the functional profile and participation of children aged 6 months to 7 and a half years, in relation to functional skills of self-care, mobility and social function; environmental changes and caregiver assistance. Data analysis was performed using a simple average of the results of the PEDI continuous score, in relation to the functional skills of self-care and mobility and assistance of the caregiver.

Results:

For functional skills, the initial PEDI indicated a mean of 47.04 points for self-care and 60.42 points for mobility. In the reassessment, the mean for self-care increased to 62.01 points and mobility to 64.92. Regarding caregiver assistance, initially, a mean of 48.56 points was obtained for self-care and 78.12 for mobility. Post-intervention, the means were 62.85 for self-care and 85.77 for mobility.
Conclusions:

An improvement in the level of functionality was observed in the functional skills of self-care and mobility and a decrease in the level of assistance from caregivers, indicated by the increase in the average. In this way, the present study points out that ISA Therapy can have positive effects for the improvement in occupational performance and participation of children with ASD in their activities of daily living.

404.246 (Poster) Effects of Procedural Integrity in Error Correction Compared to Programmed Commission and Omission Errors on Tact Acquisition during a Discrete Trial Instruction Format.

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Conclusions: Thus, awareness is facilitated that common procedural integrity errors affect teaching efficiency. In conclusion, the current study supports previous research demonstrating that high level of treatment integrity yield more efficient skill acquisition rates, whereas low integrity produced adverse effects on teaching outcome, requiring more teaching trials. Given the tremendous deficits that are seen for individuals with ASD and thus a need for well-spent time in treatment sessions, it is important for clinicians and researchers to differentiate the most efficient procedures.

404.247 (Poster) Emotion Regulation Parent Coaching for ASD

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Background: The prevalence of challenging behavior is especially pronounced in children with autism (Maskey et al., 2013). Therefore, families with children on the autism spectrum are in desperate need of accessible, high-quality evidence-based treatments that target disruptive behavior. Parent Child Interaction Therapy (PCIT), one of the most supported evidence-based interventions for defiance and non-compliance (Greco, Sorrel, & McNeil, 2001), has shown promising results for families of autistic children (Parlade et al., 2020). However, there is still debate about the use of time out procedures with this population. This study aims to gain a better understanding of parent and child progress during their enrollment in telehealth-delivered PCIT and a modified emotion-focused version of the intensive PCIT curriculum for young children with ASD.

Objectives: To examine differences in parent perceived and observed efficacy, as well as parent-reported disruptive behaviors over time and across treatment groups.

Methods: The current study is a randomized control trial with 24 families randomized into one of two treatment conditions (CDI followed by PDI or CDI followed by Emotion Based Module (EB)). All families receive a daily, time-limited, telehealth-delivered version of PCIT. Child ages range from 4 to 7. The selection criteria included (a) a child chronological age of 2 -7, (b) participating caregiver being the primary caregiver and/or legal guardian of the child, (c) a formal diagnosis of autism (d) parent’s report of emotion dysregulation or disruptive behavior as their main concern. Participating caregivers completed a series of online assessment batteries, which included parent-reported measures of child disruptive behaviors (ECBI) and parental self-efficacy. These batteries were completed at four different time points: intake, mid-treatment, post treatment and 1-month follow-up. All participants were coded for their use of PRIDE skills and “don’t behaviors” at the same time points.
Results: Preliminary results from 18 participants show that parent’s perceived self-efficacy scores increased from intake (M = 83.77; SD = 9.1) to post treatment (M = 87.06; SD = 12.24) across conditions. Use of PCIT skills remained relatively low during baseline sessions for all 18 participants, with a mean of 5.41 (SD = 4.7) observed PRIDE skills. Positive parenting behavior increased over time and across conditions. At post-treatment, a mean of 26.05 (SD = 5.65) PRIDE skills were observed (Cohen’s d effect size = 3.94, indicative of a large treatment effect). ECBI intensity scores fell from baseline (M = 124.11; SD = 37.01) to post-treatment (M = 112; SD = 39.62, Cohen’s d = 0.30).

Conclusions: Preliminary results from this study suggest that telehealth-delivered PCIT leads to significant improvements in parent’s use of positive parenting skills across EB and PDI conditions, and modest improvements in parent’s perceived self-efficacy and reported disruptive behaviors. The study highlights two different intervention approaches that could maximize treatment acceptability while effectively promoting positive parenting skills.

404.248 (Poster) Evaluating Feasibility and Acceptability of the Incredible Years® Autism Spectrum and Language Delays Program for Parents Delivered Via Telehealth (IY-ASLD-T)


Background: Webster-Stratton’s (2021) The Incredible Years® Autism Spectrum and Language Delays (IY-ASLD) Program for Parents offers a low-cost, empirically-based intervention for children’s behavioral and psychosocial challenges. Recent studies have assessed the feasibility and acceptability of IY-ASLD in community-based settings (Dababnah & Parish, 2016; Dababnah et al., 2019; Williams et al., 2020; Hutchings et al., 2016) with promising results. However, no prior studies have investigated telehealth delivery of the IY-ASLD intervention. Parents of preschool children with autism spectrum disorder and language delays have unique treatment barriers and a study of IY-ASLD revealed that 60% of eligible parents who did not participate in the study indicated scheduling or work conflicts and 16% reported distance of the program as the reason (Dababnah & Parish, 2016).

Objectives: This pilot study examines the feasibility and acceptability of IY-ASLD-T (IY-ASLD delivered via telehealth) using measures of study retention, participant satisfaction, and uptake of intervention strategies. Additionally, the study examines demographic and child-level factors (i.e., verbal behavior level at baseline) related to feasibility and acceptability of IY-ASLD-T.

Methods: Participants included N=17 mothers whose children (ages 2-5 years) attended a preschool primarily serving children with ASD. All mothers were fluent in English and all but two children had a diagnosis of ASD. Intervention included 14 weekly telehealth sessions lasting 90 minutes. Each group was composed of 4-5 mothers and a trained group leader. Measures of parents’ and children’s verbal behaviors and psychosocial well being were taken at baseline and post-intervention. Feasibility was assessed by study retention. Acceptability was assessed by program and telehealth satisfaction measures at post-intervention. Demographic data was collected on socioeconomic status, education level and employment at baseline. Child verbal level was assessed at baseline by the Vineland Adaptive Behavior Scales (Developmentally Delayed/Not Developmentally Delayed).

Results: Preliminary results from 18 participants show that parent’s perceived self-efficacy scores increased from intake (M = 83.77; SD = 9.1) to post treatment (M = 87.06; SD = 12.24) across conditions. Use of PCIT skills remained relatively low during baseline sessions for all 18 participants, with a mean of 5.41 (SD = 4.7) observed PRIDE skills. Positive parenting behavior increased over time and across conditions. At post-treatment, a mean of 26.05 (SD = 5.65) PRIDE skills were observed (Cohen’s d effect size = 3.94, indicative of a large treatment effect). ECBI intensity scores fell from baseline (M = 124.11; SD = 37.01) to post-treatment (M = 112; SD = 39.62, Cohen’s d = 0.30).

Conclusions: Preliminary results from this study suggest that telehealth-delivered PCIT leads to significant improvements in parent’s use of positive parenting skills across EB and PDI conditions, and modest improvements in parent’s perceived self-efficacy and reported disruptive behaviors. The study highlights two different intervention approaches that could maximize treatment acceptability while effectively promoting positive parenting skills.

404.249 (Poster) Examining How Training in a Caregiver Coaching Program Affects Early Intervention Provider Practices over Time

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Background:
Caregiver coaching is a recommended best practice for family-centered care in Early Intervention (EI). However, there have been persistent difficulties with implementing caregiver coaching due to a scarcity of studies focused on training EI providers to use these strategies and a lack of EI providers participating in research (Romano & Schnurr, 2022). A previous study examined effects of caregiver-implemented Reciprocal Imitation Teaching (CI-RIT) training in EI settings but did not report changes in providers’ practices beyond RIT adoption post-training (Ibañez et al., 2020). The present study aims to bridge the research-to-practice gap by investigating how training EI providers in CI-RIT changes their caregiver coaching practices over time.

Objectives:

This study examines how EI providers’ caregiver coaching practices change over time after being trained in a caregiver-implemented coaching program for young children with social communication delays.

Methods:

The data for this study was collected as part of a larger randomized controlled trial investigating the effectiveness of training EI providers to deliver caregiver-implemented Reciprocal Imitation Teaching (CI-RIT) within the Part C Early Intervention System. Thirty-eight EI providers were randomly assigned to an immediate training group (RIT Now) or waitlist control group (RIT Later). Providers reported how frequently they engaged in 10 common coaching practices during typical sessions with children with social communication delays on a 5-point Likert scale at two timepoints - before randomization (Time 1) and 6 months later (Time 2). A principal components analysis (PCA) with direct oblimin rotation was used to identify three sets of coaching practices for the Time 1 data. Items from each subscale were averaged for both time points. A repeated measures ANOVA was used to compare EI providers’ use of the three sets of coaching practices at Time 1, and mixed model repeated measures ANOVAs were used to examine the effect of training on EI providers use of coaching practices over time.

Results:

The PCA suggested a 3-factor structure of coaching practices: 1) Live Coaching, 2) Instruction, and 3) Curriculum Use (See Table 1). At Time 1 there was a significant difference in strategy use, F(2,36)=122.15, p<.001. Providers used both Live Coaching (M=4.05, SD=.67) and Instruction (M=4.24, SD=.48) at a higher rate than Curriculum Use (M=2.33, SD=.74). Mixed model ANOVAs indicated no main effect of time or group, and no group X time interaction for Live Coaching (η²=.03). or Instruction (η²=.00). However, there was a significant group X time interaction for Curriculum Use, F(1,36)=7.02, p=.012, with a large effect: η²=.16. Follow-up t-tests with Bonferroni corrections indicated that EI providers in the RIT Now group made significant gains in Curriculum Use over time, while the RIT Later group did not.

Conclusions:

This study found that providers who received training had a significant increase in reported Curriculum Use post-training in comparison to providers who did not receive training. Further investigation of how trainings impact the use of various caregiver coaching components can highlight current gaps in coaching practices and inform how to shape trainings to increase those practices.

404.250 (Poster) Examining Mechanisms of Caregiver-Mediated Intervention with Toddlers on the Autism Spectrum

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Background:

Caregiver participation in early intervention is a leading evidence-based practice in autism, but the specific strategies caregivers learn vary by intervention (Ingersoll, 2010; Oono et al., 2013). Both structured behavioral interventions and naturalistic developmental behavioral interventions (NDBIs) rely on adapting adult-child interactions to increase access to learning opportunities for children. Lack of consistent methodology for measuring caregiver behavior across interventions stymies efforts to understand the effects of changes in caregiver behavior on child behavior (Rojas-Torres et al., 2020).

Sensitivity/responsivity and learning opportunities can be compared across interventions to understand commonalities and differences amongst approaches and identify potential mechanisms of action. To our knowledge, no studies have compared caregiver behavior after learning structured behavioral and NDBIs.

Objectives:
These data describe how caregiver sensitivity/responsivity and the quality and quantity of learning opportunities provided affect child engagement in caregiver-child interactions.

Methods:

This study examines caregiver-child interactions for 80 caregiver-autistic child dyads. Caregivers received coaching in a structured behavioral intervention, Early Intensive Behavioral Intervention (EIBI), or an NDBI, the Early Start Denver Model (ESDM), as part of a larger study in which children also received therapist-implemented in-home treatment (Rogers et al., 2021). Video recordings were collected monthly for 12 months of a caregiver/child toy play activity. Naïve raters coded 287 videos from months 1, 4, 8, and 12 for: (1) caregiver sensitivity/responsivity using the Parenting Interactions with Children: Checklist of Observations Linked to Outcomes (Roggman et al., 2009); (2) the variety, frequency, and quality of learning opportunities provided, and the use of motivational strategies (i.e., environmental arrangement and incorporation of motivating materials) adapted from Davlantis and colleagues’ (2019) Learning Opportunities coding; and (3) the child’s dyadic engagement using the Joint Engagement Rating Inventory (Adamson et al., 2016).

Results:

Caregiver sensitivity/responsivity started high and did not improve significantly over time ($\beta = 1.22, SE = 0.89, p=0.17$). For caregivers who did increase their scores, change was associated with higher child engagement ($\beta = 0.07, SE = 0.02, p < 0.0001$). Caregivers in both conditions improved similarly in their delivery of Learning Opportunities, with caregiver use of motivational strategies most strongly predicting child engagement, even when controlling for sensitivity/responsivity ($\beta = 0.41, SE = 0.08, p < 0.0001$).

Conclusions:

This is the first study to look at a proximal measure of child outcome to examine the effects of caregiver coaching across autism-specific interventions. These findings suggest that caregiver sensitivity/responsivity is an important component of child dyadic engagement to consider. However, focusing solely on caregiver sensitivity/responsivity as a primary mechanism for child engagement may not be sufficient. Caregiver teaching strategies inside learning opportunities, especially child motivation-related strategies, had a positive impact on child dyadic engagement. Measuring active ingredients that occur in various approaches rather than fidelity to a particular intervention may lead to a greater understanding of general mechanisms by which caregiver-mediated interventions operate to support child learning.

404.251 (Poster) Examining Potential Predictors of Response to Early Start Denver Model in Preschoolers with Autism Spectrum Disorder

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Background: It is now well established that naturalistic developmental behavioral intervention (NDBI) started in the 3 first years of life can dramatically decrease the social deficits and learning difficulties associated with ASD. These interventions typically entail a massive commitment from families and professionals. Despite the highly significant gains associated with early intervention at the group level, response at the individual level is highly variable: some children exhibit a spectacular response, while a sizeable minority show only marginal improvement. It is therefore of critical importance to better understand “what works for whom”, in order to foster personalized therapeutic decision making.

Objectives: Exploit data from a longitudinal cohort of 84 preschoolers with ASD who have received 20h/week of early intervention following the Early Start Denver Model (ESDM) for a duration of 2 years, to examine potential predictors of response to intervention.

Methods: Following our previously published data in a smaller cohort of 55 children (Godel et al., 2022), we used a cluster analysis to determine different subgroups with different response to intervention. We then compared the obtained subgroups on various measures of functioning at baseline (cognitive & adaptive), as well as on the level of social orientation using eye-tracking (Latrèche et al., 2021).

Results: Replicating our previous result in a smaller cohort, we showed 3 distinct subgroups of response to intervention. The first subgroup showed a mild cognitive delay at intake and nearly no cognitive delay by the end of intervention. The children in the two other groups all presented with severe cognitive delay at baseline. However, they had two very different patterns of response to intervention. The majority significantly improved developmental scores over the course of intervention (in average, 34 points gained in Developmental Quotient), whereas a minority of children showed little to no improvement (in average, 9 points lost in Developmental Quotient). Further analyses showed that children who ended up having an optimal two-year intervention outcome showed rapid developmental improvement, already measurable after 6 months of intervention. There was however no difference in sex, or cognitive measures that could distinguish between children who showed the most improvement and children with minimal improvement. The only clinical measure that distinguished them at baseline was a slightly better adaptive functioning as measured with the Vineland. However, we observed a significantly higher level of...
social orienting as measured with eye-tracking in the children who showed the best response to ESDM. We further observed that parents reported increased quality of life in all subgroups, even when their child showed only moderate cognitive gain.

Conclusions: Identifying specific subgroups associated with different prognosis, sensitivity to treatment, or neurobiological mechanisms, represents a critical step toward the development of precision medicine in autism. Our results show that predicting response to ESDM intervention was better predicted using eye-tracking measures of social orienting, rather than using classically used clinical measures.

404.252 (Poster) Examining Relationships between Provider Fidelity, Caregiver Satisfaction, Therapeutic Alliance, and Child Skill Gain within a Parent-Mediated Intervention Delivered in an Early Intervention System

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Background: Research has shown parent-mediated interventions (PMIs) to be an effective approach to early intervention (EI) for autistic children (Nevill et al., 2018; Oono et al., 2013). Given their evidence base, emerging research has attempted to increase access to PMIs by training community providers to deliver them within diverse community settings, including Part C EI systems (Stahmer et al., 2020; Rogers et al., 2022). Although this research has shown that community providers can learn to deliver PMIs, it has focused less on caregivers’ experience receiving PMIs. This important gap limits our understanding of whether PMIs are aligned with the needs of all families, particularly those who are underrepresented in research (Pickard et al., 2016).

Objectives: To 1) examine caregiver satisfaction receiving one of two PMIs, Project ImPACT or the Autism Navigator, within Georgia’s EI system; 2) determine whether intervention fidelity is associated with therapeutic alliance or caregiver satisfaction; 3) assess the association between intervention fidelity and child skill gain.

Methods: Participants included 42 caregivers of children (12-30 months) receiving services within Georgia’s EI system. Children included those with an autism diagnosis or an increased likelihood of having autism. Caregivers completed surveys prior to (N=42) and following (N=14) receiving Project ImPACT or the Autism Navigator from their EI provider. Specific surveys included sociodemographic information; the Measure of Processes of Care (MPOC; King et al., 2004); and parent-reported intervention satisfaction. Caregivers rated their child’s skills using the Social Communication Checklist (Wainer et al., 2017) before and after receiving intervention as an indicator of child skill gain. All caregiver data was linked to their providers’ intervention fidelity, which was scored alongside their training in Project ImPACT or the Autism Navigator. Correlation analyses were used to assess the relationship between provider fidelity and therapeutic alliance, caregiver satisfaction, and child skill gain.

Results: Data collection is ongoing with anticipated data from an additional 20 caregivers by May 2023. In preliminary analyses, caregiver satisfaction and therapeutic alliance were rated highly, with mean scores of 4.70/5 (SD=0.33) and 4.60/5 (SD=0.43), respectively. Provider fidelity to either Project ImPACT or the Autism Navigator averaged 73.40%, with scores ranging from 58%-100%. Correlation analyses between intervention fidelity, parent satisfaction (r=0.001; p=.997), therapeutic alliance (r=-0.204; p=0.484), as well as child skill gain in communication (r=0.108; p=0.725) and social engagement (r=0.132; p=0.663) did not yield significance.

Conclusions: Although data collection is ongoing and the sample size is not powered to detect significant relationships, preliminary analyses suggest that caregivers are highly satisfied with their providers’ delivery of EI services and perceive having good rapport with their provider. Interestingly, provider fidelity to Project ImPACT or the Autism Navigator is not associated with caregiver satisfaction, perceptions of therapeutic alliance, and child skill gain. Next steps are to examine these relationships in a larger sample. These findings are important to understand what factors drive both caregiver and child outcomes in regards to the implementation of PMIs within public EI systems.

404.253 (Poster) Examining the Characteristics of Clinicians in an Echo (Extension for Community Health Outcomes) Autism Program

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Background: Individuals with Autism Spectrum Disorder (ASD) have many unmet health needs and there is a shortage of service providers with the training to diagnose and manage these patients. The ECHO (Extension for Community Health Outcomes) Autism project addresses the need for training in best practice care in ASD. ECHO is an evidence-based, tele-mentoring program for clinicians that employs a combination of didactic lectures and case-based learning delivered by a panel of content experts. We are currently offering an ECHO-Autism program in the Canadian context.

Objectives: The goal of the study is to evaluate an ongoing ECHO Autism program in Canada focusing on autism and co-occurring conditions. Here, we examined the link between clinician’s knowledge of ASD and their perceived self-efficacy in diagnosing and managing the needs of individuals with ASD. We also examined whether indicators of experience in ASD were related to clinician’s knowledge of ASD and self-efficacy.
Methods: The current ECHO-Autism program included seven bi-weekly 90-minute sessions spanning a 3-month period. The program is offered at no fee and was offered to clinicians of any profession working in the field of neurodevelopmental disorders. Didactic lecture topics covered genetic assessment, language disorder, ADHD, epilepsy, sleep disorders, and parent perspectives on comorbid complexity.

Twenty-two clinicians who registered for the current ECHO-Autism series were recruited to participate in this study. Participants completed a demographic survey that collected information about years of practice, the proportion of caseload comprised of patients with ASD, and practice setting. Participants also completed an ASD Knowledge Survey to measure knowledge of the topics to be covered during the current ECHO-Autism program at the time of enrolment. Participants also completed the Self-Efficacy Survey to measure how effective they felt at entry into the program in working with individuals with ASD.

Results: As table 1 shows, psychologists were the most represented clinical profession (45.5%) and as a group, clinicians had a mean of 7.16 years of practice (Range 0.5-22). The clinician’s mean score on the ASD Knowledge Survey was 12.73 (range 9-17; maximum score=20) and their mean rating of their self-efficacy was 88.41 (range 40-135; minimum possible score=27, maximum possible score=162). Additionally, we found a correlation between autism knowledge and self-efficacy ($r_1 = .317; p = 0.049$). Interestingly, there was no significant correlation between indicators of prior experience in ASD (years of practice, proportion of patients with ASD, prior attendance in an ECHO-Autism program) and clinician’s performance on the knowledge survey or their self-efficacy ratings.

Conclusions: The ECHO-Autism model seeks to improve clinical practice by modifying clinicians’ knowledge and perceived self-efficacy. Although clinician’s knowledge and self-efficacy were correlated, neither were predicted by their years of experience or the amount of their clinical caseload with ASD. Our findings highlight the need for ECHO programs to carefully assess characteristics of enrolled clinicians.

Background: There are many advantages to multi-site research, notably increased sample size and participant diversity, and the ability to divide responsibilities across sites. There are also challenges to conducting multi-site studies, including cross-site communication, cross-site staff training, standardization of procedures, staff travel distance and time, and participant recruitment and retention (Forjuah et al., 2015). The Reciprocal Imitation and Social Engagement (RISE) study is a multi-institutional, multi-site, type 1 hybrid effectiveness-implementation trial of a caregiver-implemented NDBI for young children with social communication delays (reciprocal imitation teaching; RIT). This trial is being conducted within the Part C Early Intervention (EI) System in 4 states (Illinois, Michigan, Massachusetts, & Washington). Due to the COVID-19 pandemic, all study activities are being implemented virtually, including research staff and EI provider training, caregiver/child assessment, and data management, supported by virtual, cross-institution research teams.

Objectives: To describe the model of our virtual, multi-site intervention-effectiveness trial. To examine the feasibility and affordances of using virtual research teams, virtual EI provider training, and virtual caregiver/child assessment protocols, as well as identify facilitators and barriers to this unique design.

Methods: Research administration data from REDCap were examined to identify participant enrollment, attrition, and demographics, the number of EI provider training and caregiver/child assessments activities completed, and research staff involved (within and cross-site). Provider training and caregiver/child assessment activities were coded as cross-site if any research staff involved were employed by a different institution than institution that enrolled the participant. Descriptive statistics were used to examine variations in participant demographics by site. Survey data of the research team after 18 months of active data collection will be examined to identify perceived benefits and challenges to this approach.

Results: Multiple virtual teams were created with research staff (PIs, post-docs, research staff, and graduate students). See Figure 1. In the first 16 months of data collection, the Liaison/Study Coordinator team has enrolled 86 EI providers and 91 families (primary caregiver and child), with an attrition rate of 15% for both groups. The Provider Training Team has conducted 5 virtual workshops, 62 virtual consultation sessions, and 47 virtual case support meetings with the 32 EI providers assigned to the intervention condition. Of these providers, 29 have been trained to certification in RIT. Depending on the provider training activity, 47-100% of EI providers were trained cross-site. The Caregiver Assessment Team has completed at least one virtual assessment with 75 families for a total of 150 assessments. Of these assessments, 53.2% were administered cross-site. Demographic characteristics of the family participants varied significantly by site, in terms of child sex (15.0-40.0% female), child minority status (28.6-80.0%), household income (6.7%-58.4% with combined income ≥ $125,000), and parent education (20.0-75.0% college degree or higher). See Table 1.
Conclusions: Our data illustrate the feasibility of using virtual teams, training, and data collection in a multi-site autism intervention trial in the Part C system. Our research staff survey data will provide additional information on facilitators and barriers to this approach.

404.255 (Poster) Examining the Infrastructure for the Adoption of Autism Evidence-Based Practices within an Early Intervention System

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Background: Naturalistic developmental behavioral interventions (NDBIs) are considered an evidence-based approach to autism early intervention (Schreibman et al., 2015). Public Early Intervention (EI) systems are frequently called upon to deliver NDBIs given that they serve a large number of young autistic children and those who have an increased likelihood of being autistic (Eisenhower et al., 2020). Although EI systems may facilitate early access to evidence-based care for autistic children, research also suggests that EI systems are complex, with both provider- and system-level factors impacting the uptake and use of EBPs (Aranbarri et al., 2021; Pickard et al., 2020). However, limited research has systematically examined how EI system infrastructure impacts the adoption and implementation of EBPs.

Objectives: 1) Examine the infrastructure for the adoption and implementation of EBPs within a public EI system, and 2) Identify how multilevel factors influence one another to impact service access and quality.

Methods: Participants were 100 providers and 9 leaders within Georgia’s Early Intervention system. Participants were 97% Female and 83% identified as contracting independently with the state. All providers completed a survey that included the following measures: 1) demographic information including age, disciplinary background, and years of experience working within EI systems and with autistic children; 2) attitudes towards adopting EBPs; 3) amount of support to attend ongoing training and consultation; and 4) amount and types of training and supervision received. A subset of 36 providers and 9 leaders also completed a semi-structured interview or focus group about factors impacting their participation in EBPs training and use of EBPs. Qualitative analysis included a combination of grounded theory and causative coding. Analyses were refined by input from providers, administrators, and other key stakeholders through round tables and presentations at the state’s interagency coordinating council.

Results: Both survey and qualitative results indicated that EI providers had generally positive attitudes towards novel EBPs and that these attitudes correlated with provider reported use of NDBIs (e.g., r = .29, p = .01). Yet a number of factors impacted the extent to which providers could adopt and implement these practices. Primary infrastructure-related themes centered on: 1) the costs associated with independent contracting structures; 2) operational demands placed on EI providers and leader; 3) workforce instability; 4) communication consistency around EBP priorities and training; and 5) leadership support for EBP training participation and implementation. Causative coding helped to demonstrate the relationships between these factors and underscored the important role of implementation leadership, including incentivization, championing, and communication in supporting EI providers’ adoption and use of EBPs.

Conclusions: Public EI systems serve as a service entry point for many families, including those with young autistic children. The current study extends previous research by demonstrating how several system-level factors play a critical role in the adoption and implementation of EBPs by EI providers, and particularly those that identify as independent contractors. These findings underscore the need for implementation strategies that target factors, such as implementation leadership, that help to increase independently contracted providers’ adoption of autism EBPs within EI systems.

404.256 (Poster) Exploring How Executive Functioning and Demographic Factors Impact Intervention Use for Young Children on the Autism Spectrum

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Background: Interventions and services for autism spectrum disorder (ASD) strive to provide children on the spectrum and their families with educational strategies, behavioral support, and tools to improve overall quality of life. Although differences in executive function (EF) are a common characteristic of ASD, little research has been conducted to identify correlates of EF and intervention use and how it may be confounded by demographic factors. Evidence suggests that access to services differs by community, notably for those of marginalized and oppressed people (Nguyen et al., 2016; Smith et al., 2020). This study will examine how EF and demographic factors impact intervention use and satisfaction.

Objectives: Our study aims to explore how lab-based measures of EF and demographic factors are associated with intervention use to better understand gaps in access and use of services in various backgrounds.

Methods: Data were collected as a part of a larger observational study examining children’s EF over time (n=54). Caregivers of children with a diagnosis of ASD completed a demographics survey, intervention history interview and children completed behavioral measures of EF.
Results: On average, children (mean age=46.8 months, SD =16.45; 83% male) participated in 4.69 types of interventions (SD=2.568) and attended 99.445 hours (SD=79.902) over the six month period. A simple linear regression was run to explore the relationship between the hours of services a child attended and household income. The regression was statistically significant (R²=.115, F(1,37)=4.03) and moderately correlated (β=.339, p=.053). Household income was also found to be significantly and positively correlated with inhibition skills (r=.486, p=.008). Another linear regression examined caregiver education and the number of interventions types a child attended. Findings were statistically significant (R² =.133, F(1,37)=5.677) with moderate positive correlations (β=.365, p=.022). EF composite scores were calculated for set shifting, delay, working memory, and inhibition using behavioral tasks and observations. No significant correlations were found for EF composites and intervention use or satisfaction.

Conclusions: Our results show significant moderate associations between family income and hours per week of intervention. These results are consistent with previous literature documenting that families from lower SES experience greater structural barriers to accessing services, such as work schedule and transportation complications (Pickard et al., 2015). Additionally, the lack of correlation between EF composites and intervention use suggests that intervention use is more greatly impacted by family income and caregiver education than EF skills. Investigating these associations with a greater sample size may increase the demographic and EF heterogeneity of the sample to better understand disparities in access to services. The longitudinal design of this ongoing study will allow for a more robust analysis in the future aimed towards assessing potential impacts of intervention on EF as well as demographic factors on characteristics such as caregiver involvement and perceived progress.

404.257 (Poster) Exploring Predictors of Response to a Peer-Mediated Communication Intervention for Autistic Preschoolers with Limited or No Spoken Language

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Background: Studies on treatment response to early interventions for autistic children report contradictory findings, possibly due to a lack of analysis of behavioral predictors at the individual level (Vivanti et al., 2014). Peer-mediated interventions (PMIs) are an evidence-based approach to improve social communication of autistic children (Watkins et al., 2015). Thiemann-Bourque et al. (2018) documented positive benefits of incorporating an iPad as a speech-generating device into PMIs for autistic children with limited or no spoken communication. Results showed clear treatment gains, yet considerable variability in peer-directed communication over time. Identifying proximal child variables that predict response to treatment has important clinical implications for tailoring PMIs for autistic preschoolers with complex communication needs.

Objectives: Determine (1) if peer-directed child communication and reciprocal exchanges change in response to intervention across inclusive settings, and (2) if change in each outcome is related to baseline levels of child predictors.

Methods: N=9 children with autism and limited spoken communication (i.e., less than 20 words) between 4-5 years participated. We have 9 children enrolled in Year 2; thus, data for n=18 will be summarized for INSAR. Pre-treatment assessments included the Preschool Language Scale-5 (Zimmerman et al., 2011) and the Mullen Scales of Early Learning (Mullen, 1995). Each autistic child was paired with 1-2 peers without disabilities (n=17; 4-5 years). Baseline rates of child-peer communication were collected in dyadic play at a table (30 min), snack (10 min), and free play (10 min). The peers were taught to Stay-Play-Talk with iPad (60 min). The peers then took turns engaging with the autistic child in dyadic play for 16 30-min treatment sessions over 8 to 12 weeks. Post-treatment observations were collected in all three social contexts.

Results: From baseline to post-treatment, rates of peer-directed communication increased significantly within the three social contexts: dyadic play (t(8)=-4.84, p<.001, d=1.61), snack (t(8)=2.55, p=.017, d=1.59), and free play (t(8)=2.17, p=.031, d=.72). Reciprocal exchanges increased significantly in dyadic play (t(8)=4.59, p<.001, d=1.53) and snack (t(8)=2.52, p=.018, d=.84). There were strong correlations between pre-treatment receptive language scores on the Mullen and change in rate of peer-directed communication during dyadic play (r =.78, p=.014), and between auditory comprehension scores on the PLS-5 and change in peer-directed communication during dyadic play (r=.64, p=.064). In addition, change in the rate of peer-directed communication in free play was strongly related to pre-treatment receptive and expressive language scores (PLS_AC r=.78, p=.014; Mullen Expressive r=.75, p=.020; and Mullen Receptive r=.63, p=.068) while change in this behavior in snack was not related to pretreatment scores (PLS_AC r=-.10, p=.081; Mullen Exp r=.27, p=.49; and Mullen Rec r=.01, p=.98).

Conclusions: Results demonstrated that Stay-Play-Talk with iPad effectively improved spontaneous peer-directed communication and reciprocity in multiple preschool settings. Preliminary outcomes show that children with higher receptive language at baseline demonstrate greater gains in communication, and the measurement context may impact outcomes. Measuring proximal child behaviors using multiple methods may allow for identifying individual differences that are relevant for tailoring PMIs to be most effective.

404.258 (Poster) Exploring the Measurement of Parent and Child Factors As Moderators of Outcome in Parent-Mediated-Intervention (PMI) for Preschool Autistic Children and Children Awaiting Diagnostic Assessments: A Feasibility Study

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INSAR 2023 ANNUAL MEETING ABSTRACTS
**Background:** Every parent/carer of a preschool autistic child, seeking support, has a right to know whether intervention will benefit their child, to maximise early intervention potential. Parent-mediated-intervention (PMI) is an approach advocated by UK National Institute for Health and Care Excellence (NICE, 2013).

PMI for young autistic children leads to changes in parent-child interaction and improved receptive language skills (Oono et al., 2013). Intervention appears to work by increasing parental responsiveness: specific mediators include parental synchrony (Pickles et al., 2015) and mirrored pacing (Gulsrud et al., 2015). Less is known about moderators of outcome (Vivanti et al., 2014); individual responses to PMI highlight variability. Parent and child factors influencing success of intervention (Trembath et al., 2019, Shalev et al., 2020, Roberts et al., 2022) are infrequently cited in the literature and theoretical motivation is rarely provided (Vivanti et al., 2014).

Often, protected characteristics are missing in autism research (Wong et al., 2015). This study responds to calls to explore for whom intervention works (Lord et al., 2022). Detailing family and child characteristics could lead to personalised support and efficacious outcomes.

**Objectives:** To evaluate the feasibility of measuring parent and child characteristics, in a clinical setting offering PMI for preschool autistic children and children awaiting assessment. Aspects of feasibility include accessibility of measures for children, acceptability of measures to parents, practicality of administration of measures and utility of data.

**Methods:** Eight parents/carers participated, their children were aged 2;9-4;11 (mean 3;5), 7 male/ 1 female. Three children were raised in bilingual environments. Two children were diagnosed with Autism Spectrum Disorder; the remainder were awaiting assessment. Three children had co-occurring conditions (e.g., Avoidant/Restrictive Food Intake Disorder/ Global Developmental Delay).

Dyads received an eleven-week PMI programme focused on parental synchrony, mirrored pacing, and environmental arrangement. Indirect and direct measures of parent and child characteristics were taken at baseline/outcome (table 1).

Five parent/carers consented to semi-structured interviews about their experience of assessment measures with interviewers not involved in intervention. Braun and Clarke’s thematic analysis guidelines were followed on anonymised transcripts using NVivo software.

**Results:** Eight children completed intervention, baseline/outcome assessment. Parent and child report measures, direct assessments considering autism symptomology and sensory reactivity were administrable, completed by all, yielding usable data.

Language, cognition and socio-cognitive assessments were completed by 100%, 62.5% and 25% respectively. Task demands meant some stimuli were inaccessible; missing results were due to children indicating their wish to stop, difficulty accessing the requirements and duration/number of assessments.

Thematic analysis of interviews revealed overall acceptability of measures to parents, learning about child’s profile of strengths and needs were perceived benefits, though burden of assessment and emotive responses to the assessment process were highlighted as needing consideration.

**Conclusions:** Measuring parent and child characteristics is feasible using direct and indirect measures, though assessments were not equally accessible. Despite assessment burden, measures were acceptable to parents, though due diligence is required to support parents when answering emotive questions about their family. Further study could determine if characteristics moderate outcomes; thus, informing decision-making, maximising early intervention potential.

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**404.259 (Poster) Eye-C: A Deep Learning System for Fine-Grained Eye Contact Analysis to Support ASD Intervention in Real-World Clinical Scenarios**

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**Background:** Predicting intervention outcomes and identifying better-tailored treatments for children with ASD are major challenges (Dawson & Sapiro, 2019). Computational phenotyping may assist therapists in monitoring child behavior by providing quantitative and fine-grained measures more sensitive to behavioral variations (Jaliaawala et al., 2020). Still, real-world behavioral analysis is an ongoing challenge and literature is lacking concrete solutions.

**Objectives:** In this study, we present a novel validation of EYE-C, a system based on Deep Learning (DL) and Behavior Imaging for the analysis of eye contact in unconstrained therapist-child interactions via a single video camera (Alvari et al., 2021). The EYE-C measures are integrated with clinical features to test their potential as predictors of outcome of intensive early intervention.
Methods: EYE-C is a 3-module Deep Learning system capable of robustly deriving 2D head coordinates (Cao et al., 2019), 3D gaze vectors (Kellnhofer et al., 2019), and a frame-by-frame prediction of eye contact episodes between individuals in videos (Alvari et al., 2021). To implement a translational and robust system under real-world conditions, we defined 3 thresholds related to the 2D headboxes position, the 3D gaze orientation, and the episode duration as model hyper-parameters for optimization. Validation was applied to manually coded segments of 5 videos of ADOS sessions involving a therapist and a preschool child with ASD dyads. The videos had different resolutions and room settings. We extracted a continuous interactive dyadic 10-minute sequence from each video (over 70,000 total frames). The hyper-parameter selection was based on Leave-One-Out Cross-Validation (LOOCV) over videos by testing all parameters combinations (900 combinations). The Matthews Correlation Coefficient (MCC) was used to measure eye-contact classification performance. To test the predictive value of the eye-contact features, we collected a sample of 25 preschool children with ASD (2-6 years) undergoing an early intensive intervention. We considered re-evaluation data of the subjects after 12 months of therapy (T1). First, we employed Random Forest (RF) regressors with LOOCV to predict ADOS score and General Quotient (GQ) at T1 by using only variables from the pre-intervention clinical evaluation (T0) as predictors. Next, we combined the eye contact features with the clinical features at T0.

Results: An average MCC=0.66 (SD=.13) was obtained on the test data, confirming good overall consistency with the manual coding, even when considering low-resolution video or larger environments. In the intervention outcome prediction task, integrating the eye-contact features with the clinical predictors at T0 baseline significantly improved performance in predicting both ADOS (from MSE=22.4 to MSE=16.2, in testing) and GQ (from MSE=229.2 to MSE=127.9, in testing) after the intervention (T1).

Conclusions: Findings from this study show the feasibility of DL-based measures within real-world scenarios. The EYE-C has the potential to help clinicians monitor behaviors; further investigation will focus on the AI/ML integration for therapy outcome prediction as a tool for personalized intervention. Prospective approaches need to close the gap between research and healthcare frameworks in order to offer effective real-world solutions to support therapists and families.

References:
- Braunstein et al., 2013
- Rankin et al., 2019
- Fox, Nordquist, Billen & Savoca, 2015
- Luiz et al., 2006
- Lord et al., 2012
- Sandbank et al., 2020

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404.260 (Poster) Fathers’ Involvement: How Dyadic Affective Profile Evolve during Intervention with Preschoolers

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Background: Despite robust evidence of fathers’ impact on children and mothers’ well-being, engaging with fathers is one of the least well-explored and articulated aspects of parenting interventions (Fox, Nordquist, Billen & Savoca, 2015). The literature highlighted the lack of empirical evidence considering fathers in the context of intervention, and most studies were conducted on mothers (Braunstein et al., 2013; Rankin et al., 2019). Previous studies focused on the evolution of specific intervention strategies delivered by fathers with less attention to emotional and affective changes in interaction with their children.

Objectives: We first aimed to investigate changes in father-child Emotional Availability (EAS, Biringen et al., 2008) during intervention with paternal involvement. Second, we analyzed paternal features influencing the child’s variables.

Methods: Participants were 20 fathers (M age = 38.80; SD age = 3.79) and their children with ASD (M chronological age = 38.25 months; SD = 11.84; M mental age = 29.74 months; SD = 13.03). Emotional Availability Scales were applied to ten minutes of video-recorded interactions before and after one year of an Intersubjectivity Parental-Based Intervention (I-PBI). Child characteristics are assessed at T0 and T1 with the GMDS-ER (Luiz et al., 2006) for cognitive functioning and with the ADOS-2 (Lord et al., 2012) for symptom severity.

Results: We found a significant difference in the total amount of the Sensitivity domain of fathers (t(19)=−4.09; p=0.001). A significant difference also emerged in the Structuring scale (t(19)=−6.25;p<0.001) and in the Non-Intrusiveness scale (t(19)=−5.45;P<0.001). However, Non-hostility scale showed no significant differences (t(19)=−1.00;p=0.33). See table 1 for Descriptive and Inferential Statistics of Fathers’ EA at T1 and T2. Concerning the child’s domains we found significant increases in the main scale of Responsiveness (t(19)=−5.10;p<0.001) and Involvement (t(19)=−4.77;p<0.001). See table 2 for Descriptive and Inferential Statistics of Child’s EA at T1 and T2. Concerning the second aim, we implemented linear regression models with the child’s cognitive functioning set as dependent variables and paternal affective behaviors of sensitivity, structuring, non-intrusiveness, and non-hostility as predictors. We found a significant model (F(4,31)=3.18; p=0.027) suggesting that non-intrusiveness (beta=0.76; p=0.28) was associated with the child’s general cognitive functioning.

Conclusions: These first results shed new light on the evolution of affective dyadic aspects of the father-child relationship, which was scarcely investigated in previous literature. Despite the difficulties in dealing with children with ASD due to the alterations in early interactions (Adamson et al., 2010; Wong & Kasari, 2012), fathers seem to benefit from a developmental intervention focused on restoring dysfunctional interactive circuits in line with previous findings (Sandbank et al., 2020). These preliminary results highlight the importance of considering not only the child’s characteristics but also paternal and dyadic features to optimize treatment outcomes.
404.261 (Poster) Feasibility and Preliminary Boscc Outcome of Brief Facial Interaction-Focused Parent Guidance for Toddlers with Prodromal ASD

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Background: Parents of autistic children typically have developmental concerns about their child long before the formal diagnosis. Toddler’s use of eye gaze is one of the most common early concerns. These parents might lack professional support for their worries and knowledge of how to facilitate interaction with their child in a child-friendly way.

Objectives: The present study aimed to evaluate the feasibility and preliminary efficacy of brief parent guidance to support facial interaction with toddlers having prodromal ASD.

Methods: Participants were recruited from welfare clinics of Tampere city, or the Department of Paediatric Neurology at Tampere University Hospital based on parent-reported positive screening (M-CHAT-R/F) or reports of autistic symptoms. Eleven children (aged 15 to 29 months) with prodromal ASD (ADOS-2 ≥ 13 and/or high parent concern and/or family risk) participated in the brief parent guidance. The guidance consists of five sessions (three in clinic and two with telehealth) over three months (M = 11, range 6–18 weeks). Guidance principles were based on techniques of Naturalistic Developmental Behavioral Interventions having an emphasis on supporting facial interaction and motivating the use of eye gaze in a child-friendly way.

Measures included feasibility outcome measures i.e., parent satisfaction questionnaire (14 questions, coded with a 5-point scale) and interventionist fidelity checklist, and the primary outcome measure Brief Observation of Social Communication Change (BOSCC). The BOSCC was observed before and after the program in a 12-minute parent-child play session, and measures two core domains: social communication (SC) and restricted repetitive behaviours (RRB). The differences between baseline and post measures in BOSCC were calculated with Wilcoxon signed rank test in within sample design. If the difference was statistically significant, reliable change index (RCI) was calculated to assess at an individual level whether the change was clinically meaningful (±1.96). To calculate the RCI, test-retest reliability estimates were applied for BOSCC core total, SC, and RRB (0.90, 0.89, and 0.79).

Results: Results indicated that brief parent guidance was acceptable and feasible. Parents reported being very satisfied to the guidance (M = 4.29, range 2–5, response rate 73%). The fidelity of interventionist was acceptable (> 0.80).

The Wilcoxon signed rank test revealed a statistically significant difference between baseline and post measures in BOSCC core total (z = -2.14, p = .033, r = .46). Differences were not statistically significant separately for SC (z = -1.69, p = .090, r = .36) or RRB (z = -1.52, p = .130, r = .32), although the effect sizes were medium. The RCI values based on the BOSCC core total indicated that after parent guidance seven children (64 %) showed clinically meaningful improvement, one child (9 %) clinically meaningful deterioration, and for three children (27 %) changes were not clinically meaningful.

Conclusions: The feasibility findings of the brief parental guidance were promising and support the further efficacy study with a larger sample size. According to a participatory view, it seems highly essential to support parents also before the formal diagnosis when their concern of their child’s development is high.

404.262 (Poster) Feasibility of an Integrated Cognitive-Behavioral Treatment for Anxiety in Young Autistic Children

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Background:

In autistic children, anxiety often begins in early childhood, i.e., 6 years and under, and causes lifelong impairment. Yet, few studies have examined anxiety treatments for this group. Additionally, no studies have examined if targeting mechanistic factors that maintain anxiety, such as intolerance of uncertainty (IU; negative response to uncertainty) and parental accommodation (PA; helping child avoid anxiety), in the context of anxiety treatment enhances treatment response. More work is urgently needed to trial new interventions targeting anxiety, IU, and PA in young autistic children.

Objectives:

This Phase I clinical trial investigates the feasibility of a novel anxiety intervention, DINO Strategies for Anxiety and Intolerance of Uncertainty Reduction (DINOSAUR), in 4-6 year-old autistic children with anxiety.
Methods:

Fourteen young autistic children (4-6 years) and their parents participated in DINOSAUR, a manualized 14-week group telehealth intervention that utilizes cognitive-behavioral strategies to target IU and anxiety. Feasibility was assessed using descriptive statistics of participant retention, group attendance, and weekly parental satisfaction ratings. Qualitative data regarding parental satisfaction obtained through two focus groups (n=7) was also examined using thematic analysis. An inductive, or “bottom-up” approach to coding was used, which prioritized participants’ experiences. Preliminary efficacy was also explored using descriptive data from the 1) Anxiety Disorder Interview Schedule-Autism Spectrum Addendum primary anxiety disorder clinician severity rating (CSR) which ranges from 0 to 8 (≥ 4 = clinically significant) and 2) Clinical Global Impressions Scale (CGIS) which ranges from 1 “very much improved” to 7 “very much worse.” Both measures were completed at pre- and post-treatment by a trained tester who did not deliver the intervention.

Results:

Descriptive data indicate low attrition (16%), high attendance rates (96% of sessions), and high parent satisfaction ratings (1-5 Likert scale; M=4.3, SD=.86). Qualitative parental data indicate that the intervention was helpful and decreased child anxiety levels. While many parents were familiar with the topic of anxiety, the concepts of IU and PA and their impact on child anxiety were novel. Furthermore, differentiating anxiety and autism traits, cueing relaxation strategies when children were behaviorally escalated, and weaknesses in child emotional awareness remained difficult for many parents following the intervention, though these skills did improve. (“I still don't think he understands even the definition of anxiety or that he's getting there when he's feeling those feelings, but for the first time he made the connection that he can kind of control his breathing, control his heart rate, things like that.”) Descriptive outcome data also supported the potential of treatment efficacy. Nine out of 11 participants demonstrated a reduction in ADIS/ASA primary anxiety disorder CSR (Figure 1), and 55% of participants were rated “much improved” to “very much improved” on the CGIS.

Conclusions:

An integrated treatment targeting anxiety, IU, and PA is feasible for young autistic children. Data support a large-scale, randomized-controlled, Phase II trial examining preliminary efficacy.

404.263 (Poster) Feasibility, Acceptability and Effectiveness of a Model of Online Parent-Mediated Intervention for Children with Autism Spectrum Disorder in Vietnam

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Background:

Early intervention is crucial to maximise the developmental outcomes for children with autism spectrum disorder (ASD). However, the majority of children with ASD who live in low and middle-income countries (LMICs) do not receive treatment due to a lack of feasible and effective intervention services and a chronic shortage of therapists. Parent-mediated interventions (PMI) shows promising potential to improve parents’ knowledge and skills to deliver intervention for their children and address core deficits of children with ASD. At the same time, interventions delivered via internet was shown to be feasible to bridge geographic and resource gaps and increase the accessibility to services, especially during Covid-19 pandemic.

Objectives:

Assessing the feasibility, acceptability, and effectiveness of a PMI e-training program which was designed based on Applied Behaviors Analysis theory and naturalistic developmental approaches to support parents to learn skills to conduct intervention for their children. This online PMI program has three components: recorded e-lectures, group e-meeting sessions and e-coaching. The recorded e-lectures has three modules comprising 21 e-lectures, each lasting 20 minutes. Parents are also invited to attend 9 one-hour group discussion each week and receive individual 9-week coaching through weekly video feedback and 03 individual sessions (one hour each) for each family.

Methods:

This study used a mixed method. Structured interview was conducted using “Caregiver Knowledge and Skills Test” self-administered questionnaire designed by CST training program of WHO and in-depth interviews and group discussions. Data on parents’ attendance and usage of course materials are also analyzed to assess feasibility and acceptability. The study was conducted from February to May 2020 (baseline assessment) and from June to August 2020 (intervention) in two provinces of Vietnam. 30 caregiver-child pairs in intervention group and 25 caregiver-child pairs in control group participated in the study.

Results:
Background: Parent-child interaction (PCI) is the proximal target of pre-emptive interventions focused on optimising the infant’s social environment, and has been shown to be affected in infants at elevated likelihood of autism (EL-ASD) (Wan et al., 2019), predictive of ASD in EL-ASD infants (Wan et al., 2013), and enhanced with pre-emptive intervention (Green et al., 2015). The latter is the iBASIS trial (Intervention within the British Autism Study of Infant Siblings), which involved video-feedback to sensitize parents to relational and communicative qualities of their PCI (iBASIS-VIPP), and which reported significant PCI effects but which attenuated at long-term follow-up (Green et al., 2017). Further analysis of PCI videos can enrich our understanding of this key mechanism of interest in infancy interventions.

Objectives: (1) **Trial Follow-up study:** Were research lab PCI improvements (in parent nondirectiveness and child attentiveness to parent) from iBASIS sustained at 36 months when the MACI was used? (2) **Subsample Home PCI study:** Were baseline ‘low parent-sensitivity’ dyads more (or less) amenable to PCI change through the course of the home therapy? (3) **Predictors study:** Which parent-infant dyads are most amenable to PCI change in the trial?

Methods: The MACI (Manchester Assessment of Caregiver-Infant Interaction) was utilised, a validated global measure of PCI (Wan et al., 2018). Videotaped PCIs from the iBASIS trial were blind-coded: (1) at post-intervention follow-up (24m, 36m), enabling longitudinal analyses across 4 time points (follow-up and predictors studies); (2) from home therapy sessions (sessions 0, 2, 4, 6 and end point) in a subsample of 13 dyads, randomly selected from high and low baseline parent PCI ratings, totalling 61 PCI samples coded in random order (home PCI study).

Results: (1) The parent nondirectiveness/synchrony effect which attenuated at follow-up, as previously reported using DCMA (Dyadic Communication Measure for Autism; Green et al. 2017), was confirmed using MACI nondirectiveness only. By contrast, the effect on child attentiveness/initiation, also reported previously using a MACI/DCMA combination, was not found using MACI child attentiveness alone. (2) Quite high stability was found between subsample baseline home and lab PCIs (e.g. infant attentiveness to parent; \( r = .65 \)). The ‘low parent sensitivity’ dyads at baseline in both parent and infant behaviours, based on home and lab PCIs, showed high amenability to change, with interactions improving mostly between therapy session 4 to endpoint. (3) Baseline predictors (parental education, infant non-verbal IQ, infant verbal communication, autism symptomatology) of PCI trajectories will be reported.

Conclusions: Overall, the MACI (infant and toddler versions) successfully captured continuities and change across multiple time points, charting therapy progression (home visits) and research evaluation visits from 10-36m (in the lab). Adding to previous iBASIS trial findings, child attentiveness to parent/communication initiation diverged between the two measures as the child moved beyond two years. Reasons for this divergence are discussed. The sub-sample findings on 7 EL families who began with low parent PCI ratings showed both parent and infant interactional changes as therapy progressed.

404.265 **(Poster)** Identifying Predictors of Parent Motivation to Participate in Caregiver-Mediated Early Intervention Programs for Autism

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Background:

Parent motivation early in treatment has been associated with increased parent participation in caregiver-mediated interventions and improved outcomes for children with behavioral challenges (Haine-Schlagel & Walsh, 2015). However, the extent to which this is true for caregiver-mediated interventions for autism remains unclear. There is also evidence that community providers’ perceptions of parent motivation influence their likelihood of recommending caregiver-mediated interventions for autism, and that these perceptions may be related to family sociodemographic characteristics (Tomczuk et al., 2022). Thus, it is vital to understand the parent, child, and demographic factors that influence parent motivation in caregiver-mediated interventions for autism to address participation barriers.

Objectives:

This study examines 1) whether parent motivation is associated with parent participation in caregiver-mediated Naturalistic Developmental Behavioral Interventions (NDBIs) and 2) whether parent, child, and demographic characteristics predict parent-reported motivation to participate in caregiver-mediated NDBIs.

Methods:

Parents of young children with autism or social-communication delays from two studies of caregiver-mediated NDBIs participated. Parents in Sample 1 (n=46; M<sub>age(years)</sub>=35.54, SD=6.08) participated in a study of a telehealth-delivered caregiver-mediated NDBI (Project ImPACT Online). Parents in Sample 2 (n=65; M<sub>age(years)</sub>=34.59, SD=5.99) participated in a study of a caregiver-mediated NDBI (Reciprocal Imitation Training; RIT) in the Part C Early Intervention System. At intake, parents completed questionnaires including the Parent Motivation Inventory (PMI) “Readiness to Change” subscale, Parenting Stress Index (PSI), and demographic surveys. To measure parental self-efficacy, Sample 1 completed the Parenting Sense of Competence Scale (PSOC) while Sample 2 filled out the Parenting Efficacy Scale (PES). Sample 2 additionally completed the Brief Infant-Toddler Social and Emotional Assessment (BITSEA). For Sample 1, parent participation in the online tutorial of Project ImPACT Online (percentage of learning activities accessed) and program completion were available.

Results:

In Sample 1, a hierarchical linear regression controlling for correlated sociodemographic variables (parent age) in the first step found that parent PMI Readiness significantly predicted program participation (β=.32, t=2.26, p=.03). Pearson correlations revealed that the PSI Total Score, BITSEA Total Problem Score (Sample 2 only), and demographic factors (caregiver sex, minoritized status, college education, age, marital status, and household income) were not significantly correlated with PMI Readiness in either sample. While parental self-efficacy measured by the PSOC was significantly correlated with PMI Readiness in Sample 1 (r(38)=.31, p=.048), self-efficacy measured by the PES was not significantly correlated with PMI Readiness in Sample 2 (r(63)=.04, p=.77).

Conclusions:

Preliminary results suggest that higher parent-reported motivation on the PMI predicted increased participation in a telehealth-based caregiver-mediated NDBI for autism. Surprisingly, few child, family, and demographic characteristics were related to parent motivation across samples. While the PMI has been well-established as a predictor of treatment adherence in the literature and in our study, more knowledge is needed about factors associated with parent motivation. Parental self-efficacy may be correlated with motivation and further analyses will examine how distinct measures differentially predict motivation. Future research will also investigate how family sociodemographic factors may predict in-session parent engagement with the provider and intervention strategies using an observational coding scheme rather than parent report.

404.266 (Poster) Implementing a Sustainable Parent-Mediated Intervention for Toddlers with Autism Spectrum Disorder in Goa, India: Partnership, Training, and Locally Sustainable Growth

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Background: Social ABCs is a low-cost, parent-mediated NDBI developed in Canada to meet the need for evidence-based, cost-effective intervention for toddlers with suspected or confirmed Autism Spectrum Disorder. With strong evidence of community translation established across Canada, this pilot project evaluates the feasibility of remotely training staff in India to become certified as coaches and community trainers. This training model offers lower resourced countries such as India the ability to access high-quality training, and the future opportunity for trainers in India to train teams across India at substantially lower cost.
Objectives: To determine feasibility and acceptability of remotely training staff at a non-profit child development centre in Goa, India to effectively implement and attain community-trainer certification in the evidence-based Social ABCs parent-mediated early intervention program using the established Canadian training model and materials.

Methods: Two staff from Sethu Centre for Child Development were identified by the Canadian Social ABCs team through the Indo-Canadian Autism Network. Eligibility included English-fluency and a background child development. The team met virtually over six months, working with local families. Trainees’ implementation, parent-coaching skills, and didactic content delivery were evaluated using Canadian fidelity measures via video coding. Parent fidelity and child responsiveness were measured to ensure efficacy. Once certified as coaches, trainees were supported by the Canadian team to train and evaluate two of their internal staff. Indian site trainers are now poised to train an external clinical site. No adaptations were made to the training model, program materials, or delivered service. Costs of receiving training from the Canadian team versus receiving locally from the Indian team were compared.

Results: Completing the 6-month training, the two trainees achieved >85% in both implementation and coaching fidelity with 3 three parent-child dyads and were certified as Social ABCs parent coaches. To complete site-trainer status, they have trained one internal staff, who also achieved >85% fidelity in both implementation and coaching fidelity, and are actively training an additional staff (to be signed off early 2023) for a local team of 4. The community trainer phase is underway, with a contract to train two external staff at a centre in northern India. To date, 10 rounds of the Social ABCs program have been completed with 55 families in India, achieving implementation fidelity and child responsiveness rates comparable to Canadian families (reported in a linked submission; Kantawalla, et al). There is a 47% cost savings ($30,000 versus $16,000 CAD) having local trainers in India deliver training with Canadian supervision. Once independent, the cost is reduced further, to approx. $11,000 CAD, representing a reduction by almost two-thirds.

Conclusions: Remote training is a cost-efficient method of training staff to achieve parent-coaching certification in the Social ABCs, transcending geographical and cultural barriers. The Canadian team successfully trained two staff from different disciplines to achieve both Parent Coach and Site Trainer certification, on-track to achieve Community Trainer status in 2023, whereby they can train external teams. This sustainable training model increases equity and accessibility of high-quality intervention across lower resourced countries such as India.

404.267 (Poster) A Qualitative Inquiry into Autistic Adults’ Views on Intervention Goals for Young Autistic Children

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Background: Behavioral intervention programs and Individualized Education Programs for autistic children are structured around goals targeting skills based on assessments of children’s strengths and challenges. Skill domains commonly include social interaction, communication, daily living, academics, and behavior. While advocates have argued that some goals are discriminatory toward disabled individuals and may contribute to masking of autistic traits, little empirical research has explored autistic individuals’ perspectives toward such intervention goals.

Objectives: This study aimed to elicit feedback from autistic adults regarding their perspectives on common intervention goals for young autistic children. The following more specific research questions were investigated: 1) Why do participants view some intervention goals more positively or negatively than others? 2) What suggestions do participants make for improving intervention goals in the future?

Methods: 235 autistic adults took an online survey and were presented with 19 statements about intervention goals (e.g., “Improving Interpersonal Skills is a good intervention goal”). Participants rated their agreement with the statement (presented elsewhere) and were then provided with a textbox and asked, “Is there anything you’d like to add regarding your feelings toward this statement?” The number of responses to each question ranged from 120 to 189. Responses were analyzed using reflexive thematic analysis. The research team includes both autistic and non-autistic researchers.

Results: Preliminary analysis generated three themes: 1) Goals Should Lead to Autistic Wellbeing; 2) Tension between Intervention Goals & Methods; and 3) Remedies to the Double Empathy Problem.

Many responses categorized into the first theme (Goals Should Lead to Autistic Wellbeing) touched upon the idea that goals for autistic children need to be defined from an autistic—not neurotypical—perspective. For example, when trying to improve an autistic individual’s quality of life, who defines what a high quality of life looks like? Participants also raised issues surrounding the difference between independence and autonomy/interdependence and the importance of considering intersectionality.

With regards to Tension Between Intervention Goals & Methods, participants pointed out that some goals (e.g. reducing self-injurious behavior) were highly acceptable, but just reducing behavior was not enough: interventionists need to dig deeper into the root causes of such behavior. Participants also noted that goals can be acceptable but the methods used to teach skills might not be.
The final theme (Remedies to the Double Empathy Problem) related to how interventionists and society as a whole could shift away from placing the burden of successful interactions entirely on autistic individuals. Many participants suggested that neurotypical individuals need education about how to interact with neurodivergent people. Some felt it would be helpful to teach autistic children about neurotypical norms without enforcing compliance with them.

Conclusions: This analysis provides insight into how autistic adults view intervention goals for young autistic children. The themes generated could be useful for interventionists and educators as they attempt to select goals aligned with the autistic community’s needs. Notably, nuanced approaches seem necessary and simply adopting a “good” goal without considering contextual factors, definitions, and intervention procedures is unlikely to be seen as acceptable.

404.268 (Poster) A Systematic Review of Social Validity Assessment in Pivotal Response Treatment Research

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Background: Social validity refers to the extent to which stakeholders find an intervention acceptable and consists of three features: significance of goals, appropriateness of procedures, and importance of outcomes. Social validity is recognized as a crucial part of any intervention and is listed as a criterion for establishing evidence-based practices. Despite its importance, recent reviews have found that social validity is not frequently assessed in behavioral intervention studies. When it is assessed, parents or providers are often asked for their perspectives, while the disabled participants themselves are rarely consulted (though few reviews actually report on this). Some interventions, however, such as Naturalistic Developmental Behavioral Interventions (NDBIs), are specifically designed to center autistic children’s needs, strengths, and preferences. While this framework suggests such interventions are socially valid, the extent to which social validity is actually assessed in NDBI research is unknown.

Objectives: This study aimed to systematically review literature to determine how social validity is assessed in research on Pivotal Response Treatment (PRT), a prominent NDBI. More specifically, research questions focused on 1) frequency of social validity assessment; 2) assessment methods; and 3) who was asked to make the assessments.

Methods: This analysis is part of a larger systematic review on social validity assessment in all NDBI research. Studies were eligible to be included in the review if they were 1) focused on one of the six NDBIs listed in Bruinsma et al. (2020); 2) reported on an intervention with at least one autistic individual; and 3) were written in English. 747 abstracts (excluding duplicates) were retrieved from ProQuest, EBSCOhost, and Web of Science. 153 eligible reports focused on PRT; 150 full texts have been analyzed (3 full texts have not yet been located). The authors coded each article for relevant study details and information pertaining to social validity (e.g. intention to assess “social validity”/“satisfaction”/“acceptability”, who was involved in the assessment, etc.). Analysis is ongoing.

Results: Studies were published between 1991-2022. Most included infant, preschool, and/or elementary school children, though some included middle schoolers (n=15) and high schoolers (n=2). Interventionists in these studies included research staff (n=63), parents (n=62), community practitioners (n=36), and peers (n=14). Of the 150 articles reviewed, 48 intentionally sought to assess social validity. Studies often assessed social validity by consulting parents (n=28), teachers/clinicians (n=17), or others (e.g., blind raters, peers; n=13). Only four studies sought out the autistic intervention recipient’s perspective, all of which were published within the past five years. These studies used interviews and/or questionnaires to elicit feedback from the autistic participant.

Conclusions: The majority of PRT research reports do not assess social validity, and very few report eliciting feedback from the autistic intervention recipients. Future PRT studies must assess social validity more frequently and include the perspective of autistic participants. Increased social validity assessment represents one step toward ensuring interventions are acceptable to autistic individuals and do not cause them harm.

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434.184 (Poster) Improvement in Autism-Related Challenges for Autistic Youth Receiving Project Impact in the Medicaid System

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Background: Project ImPACT is a manualized parent-mediated intervention that targets social communication skills in young autistic children. Though it is effective when delivered in lower-resourced early intervention systems (Stuhmer et al., 2014), no studies have taken place in the Medicaid system.

Objectives: Examine changes in autism-related challenges in Medicaid-enrolled autistic children receiving Project ImPACT.
Methods: The sample included 19 families of Medicaid-enrolled autistic youth aged 6 and under who received Project ImPACT. Caregivers completed the Autism Impact Measure at 5 time points. It includes five subscales: Communication, Social Reciprocity, Peer Interaction, Repetitive Behavior, and Atypical Behavior. We ran a series of two-level hierarchical linear models to estimate the linear time trend on each subscale and determining whether the time trend interacted with child demographics (age and racial/ethnic minority status).

Results: See Table 1 for results. Racial/ethnic minority status was not associated with outcomes, though the interaction of age X time was marginally significant for some subscales (see below).

Controlling for demographic variables, there was a marginally significant linear decrease in amount of autism-related challenges, such that with every additional week, total autism-related challenges decreased by 1.83 points (t(38.90) = -1.71, p = .10).

Controlling for demographic variables, there was a marginally significant effect of the interaction of age X time on atypical behavior, t(11.52) = -1.92, p = .08. A simple slopes analysis demonstrated that atypical behavior in younger children did not change over time. There was a marginally significant linear increase in atypical behavior for older children (1 SD above mean), such that, with every additional week, older children were rated as becoming more atypical, with ratings increasing by 1.73 points each week (t(13.54) = -1.96, p = .07).

Controlling for demographic variables, there was a marginally significant effect of the interaction of age X time on repetitive behavior, (t(41.49) = -1.80, p = .08. A simple slopes analysis demonstrated that there was a significant linear decrease in repetitive behavior for younger children (1 SD below mean), such that, with each additional week, ratings of repetitive behavior decreased by 2.14 points (t(42.57) = -2.08, p = .04). Repetitive behavior in older children (1 SD above mean age) did not change significantly over time. See Figure A.

Controlling for demographic variables, there was a marginally significant linear decrease in peer interaction challenges, such that, with each additional week, ratings of peer interaction challenges decreased by 0.29 points (t(30.13) = -2.01, p = .05).

For communication and social reciprocity, there were no significant linear time trends when controlling for demographics.

Conclusions: Overall autism symptomology and challenges with peer interaction improved. There were marginal effects of the interaction of age X time for repetitive behavior and atypical behavior, such that younger children improved in repetitive behavior, and older children had more atypical behavior over time. Contrary to hypotheses, children did not significantly improve in communication or social reciprocity. Clinician fidelity was low, likely affecting child outcomes. Future studies should examine outcomes in a larger sample that may be more powered to detect changes.

Background: Behavioral contingency, or ensuring that a child’s actions predictably lead to desirable items and activities, is a critical component of early autism intervention efforts (McDaniel et al., 2020). This if-then relationship is a powerful teaching tool that can propel children’s first word development, increasingly complex language use, and the use of appropriate behavior to access favorite activities and objects. Therefore, behavioral contingency is a particularly important skill to equip parents with for use in their home environment. Caregivers who struggle to stay contingent and give in to undesirable behavior and/or offer their child desired items non-contingently can lead to a de-incentivization of their child’s use of language. Self-directed parent training efforts may be effective in teaching early autism intervention strategies, including the use of behavioral contingency (de Korte et al., 2022; White et al., 2021). The current study examines improvements in parent contingency after completion of the PRT app-based training program.

Objectives: The aim of this study is to examine improvements in parent use of behavioral contingency in the context of 5-minute parent-child intervention probes, submitted during participation in an app-based parent training program.

Methods: Participants include 48 parent-child dyads across the U.S., analyzed as a single cohort to allow researchers to remain blind to group assignment during this phase of the project. 24 dyads were randomized to a video self-scoring PRT app version and 24 to a standard PRT app without self-scoring functionality. All child participants are between 1 and 4.5 years of age and have an existing diagnosis of ASD in addition to parent concerns of language development. Parents complete intake and follow-up assessments, eight PRT lessons, and record and review parent-child videos in-app after each lesson, which are then reviewed by the research team for analysis. Research assistants were blinded to study condition and coded each parent-child video submission for the presence of intervention components and child behaviors. Parent contingency was defined as parents successfully creating a three-step ABC learning opportunity and successfully reinforcing a child’s language attempt or withholding the reinforcer if the child did not respond.
Results: A paired-samples T-test was performed, analysis revealed that the entire project cohort of parents significantly improved their use of behavioral contingency (p = .011, Cohen’s d = 1.03). Specifically, participant parents improved their use of behavioral contingency from baseline (M= 29.3%, SD = 25.9) to program completion (M= 57.7%, SD = 26.6).

Conclusions: Technology-assisted self-directed training efforts show promise for teaching parents core intervention skills. This continued use of behavioral contingency is likely to contribute to desirable child language and broader developmental outcomes.

434.186 (Poster) Improvements to Parent Intervention Fidelity and Dosage after Participation in a Pivotal Response Treatment App-Based Training Program


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Background: In order for parent-mediated intervention efforts to be optimally impactful, caregivers must deliver interventions with both (a) treatment fidelity, or close adherence to the intervention protocol, and (b) sufficient dosage during parent-child interactions to be therapeutically beneficial (Trembath et al. 2019). These training outcomes are particularly important to examine in the context of self-directed and telehealth training experiences, as parents are often the sole deliverer of the intervention. Given the lack of clinical support from trained professionals in self-directed training models, the need for effective parent mastery and regular use of skills and concepts should be prioritized and carefully monitored. In the current study, we examined changes in parent treatment fidelity and therapeutic dosage after completion of a self-directed app-based training program, Pivotal, which provided training in the Pivotal Response Treatment (PRT) early autism intervention model. PRT is a parent-friendly naturalistic developmental behavioral intervention (NDBI, Schreibman et al., 2015) that combines motivational and behavioral principles to target social communication skills in naturalistic settings.

Objectives: To examine the increase in the dosage of successful parent-initiated PRT sequences and overall mastery of PRT components following the completion of the Pivotal App.

Methods: Participants include 48 parent-child dyads across the U.S. (24 randomized to a video self-scoring PRT app version and 24 to a standard PRT app without self-scoring functionality). Child participants (1 - 4.5 years) have an existing diagnosis of ASD and parent concerns of language development. Parents complete intake and follow-up assessments, eight PRT lessons, and record and review parent-child videos in-app after each lesson, which are then reviewed by the research team for analysis. Researchers, blinded to the treatment conditions, score all videos for a stringent measure of PRT fidelity of implementation (requiring the presence of all components to be considered a “passing trial”), along with dosage during a 5-minute parent-child intervention probe, with dosage defined as one successful PRT sequence containing all PRT Fidelity components outlined in Table 1.

Results: Preliminary analysis of baseline (Module 0) and end of study (Module 8) intervention videos from participating families indicate an increase in the number of successful parent-initiated PRT trials. Overall, the number of parent-initiated PRT trials increased from a mean of 2.25 (SD = 2.55) at Module 0 to 6.12 (SD = 5.59) at Module 8 during each 5-minute parent-child intervention video. Additionally, the percentage of PRT components achieved by caregivers increased significantly from a mean of 25% (SD = .2) at Module 0 to 57% (SD = .25) at Module 8, p<.05.

Conclusions: The Pivotal app demonstrates promising improvements in parent implementation of PRT strategies. Specifically, analysis of parent-uploaded videos were indicative of an increase in the total number of successfully delivered PRT trials and fidelity of PRT components used. These data provide promising evidence that parents are effectively learning PRT skills through the Pivotal app and providing increased language opportunities for their child.

434.187 (Poster) Increases in Child Language Attempts Following Parent Training in Pivotal Response Treatment

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Background: Delays in social communication is a hallmark characteristic of autism and key target for early intervention efforts (Lane, Liberman-Betz, & Gast, 2015). As such, natural language samples of child word use and word attempts can provide important insights into linguistic improvements associated with early intervention efforts (Barokova & Tager-Flusberg, 2020). Specifically, examining videos of parent-child interactions can yield important data regarding the frequency of a child’s verbal requests, responses to prompts, and social uses of language. These data provide evidence of improvement accompanied by a high degree of ecological validity, as they capture interactions within the natural home environment with a natural social partner (the child’s caregiver). The current investigations examined parent-child videos collected before and after a parent-training clinical trial.

Objectives: To examine improvements in total child verbal utterances, responses to prompts, initiated requests, and social uses of language in the context of a parent-training clinical trial.
Methods: This investigation used a randomized clinical trial design to compare two versions of an app-based parent training model in Pivotal Response Treatment. Participants were 48 parent/child dyads who completed the 8-lesson program over the course of 4-12 weeks. Parents submitted 5-minute parent-child interaction videos at intake and after every two lessons were complete. For the current investigation, all participants were analyzed in a single cohort and pre- and post-project videos were coded by research assistants masked to study condition and timepoint. Coded measures were as follows: Total Child Vocalizations were defined as all directed child word or word attempts. Child Spontaneous Verbal Requests were defined as an unprompted child word or word attempt intended to obtain a desired item or activity. Child Responses to Prompts were defined as responses to a caregiver’s verbal model or question that was intended to elicit a response. Finally, Child Social Language was defined as words or word attempts intended to attract or direct social attention.

Results: A series of repeated measures T-tests were conducted to compare pre-post means. Significant differences were found for Total Child Vocalizations (p = .006; Cohen’s d = 1.18), Responses to Prompts (p = .028; Cohen’s d = .81), and Social Language (p = .007; Cohen’s d = 1.16), but not for Child Spontaneous Verbal Requests (p = .170; Cohen’s d = .36). Total Child Vocalizations improved from a mean of 18.6 vocalizations/words (SD = 13.4) at intake to a mean of 32.9 vocalizations/words (SD = 19.0) at post-intervention. Responses to Prompts improved from a mean of 8.5 vocalizations/words (SD = 5.2) to a mean of 13.6 vocalizations/words (SD = 8.7). Social Language improved from a mean of 8 vocalizations/words (SD = 10.7) to a mean of 15.1 vocalizations/words (SD = 13.0).

Conclusions: The results of this relatively brief app-based parent-training program yielded exciting improvements in child verbal communication skills. These data support of promise of technology-assisted methods to empower parents to target core social-communication vulnerabilities in young children with autism.

Background: Lack of child responsiveness to social communication bids is a recognized core vulnerability of autism that has downstream implications for social engagement, social relationships, and social learning (Watkins et al., 2015). Because human learning is inextricably tied to noticing and responding to the social bids of others, this is arguably a critical target during early intervention efforts. Motivation-based intervention models such as Pivotal Response Treatment use child selected and preferred activities as a means to increase attention to an adult social partner and increase the likelihood that a child will respond to their presented learning opportunities (Gengoux et al., 2019; Lei & Ventola, 2017). The current study targeted parent intervention skills in the context of a self-directed app-based training program called Pivotal.

Objectives: To analyze increases in child responsiveness during parent-child intervention sessions between pre- and post-program 5-minute intervention probes.

Methods: Participants included 48 parent-child dyads recruited nationwide and randomized to two versions of the Pivotal app. For this study, they were analyzed as a single cohort, as the research team remains masked to group assignment at this phase in the project. Child participants (12 to 56 months) have an existing diagnosis of ASD and a language delay. Parents completed intake and follow-up assessments, eight weekly PRT lessons, and recorded and reviewed parent-child videos in-app after every two lessons, which were then reviewed by the research team for analysis. Research assistants, masked to study condition, coded each parent-child video submission (5-minute videos) for the presence of intervention components and child behaviors. In the context of this investigation, child responsiveness was defined as a percent of parent-initiated PRT antecedent bids that were immediately followed by an appropriate child verbal response.

Results: Using a paired-samples T-test, the entire project cohort of children with autism significantly improved their responsiveness to parent social communication bids (p = .005, Cohen’s d = 1.26). Specifically, children improved their responsiveness from a mean of 27.9% (SD = 20.9) of the time at intake to a mean of 58.2% (SD = 15.2) after program completion. This improvement was not simply due to an increase in the number of parent-initiated social communication bids, which did not significantly differ between intake and program completion (p = .152). This suggests that the quality (rather than quantity) of parent bids drove increases in child responsiveness as parents mastered the PRT intervention strategies.

Conclusions: Parents who participated in this app-based clinical trial appear to have learned effective strategies for engaging their child in intervention efforts. Motivation-based early intervention efforts that increase child responsiveness may have a significant impact on downstream child developmental outcomes.

434.188 (Poster) Increasing Child Responsiveness to Social Communication Bids: Results from the Pivotal App Clinical Trial
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434.189 (Poster) Incredible Years-Asld® Delivered Via Telehealth: Examining Pre-Post Changes in Verbal Behavior during Dyadic Play
Background:

The Incredible Years-Basic Parenting Program® (IY; Webster-Stratton, 2001), is a well-established, evidence-based group parenting intervention with over 50 randomized control trials (RCTs) demonstrating its efficacy with a wide range of families in reducing disruptive child behavior and parental stress, as well as enhancing positive parenting practices (see Menting, et al., 2013 for a meta-analysis). Recently, the Incredible Years has modified its preschool program to meet the unique needs of families with young children with autism spectrum disorder and language delays (IY-ASLD; Webster-Stratton, 2018). During the pandemic, we worked with program developer, Carolyn Webster-Stratton, to adapt IY-ASLD to a telehealth format. We piloted IY-ASLD-T in small-scale quasi-experimental study before beginning an RCT now in progress. This paper reports on findings from the pilot with 17 mothers with young children (ages 2-5) classified as a preschooler with a disability attending an all-day Applied Behavior Analysis preschool. This presentation reports on observed changes in maternal language targeted by the IY-ASLD curriculum during parent-child interactions assessed over Zoom at baseline and post-treatment.

Objectives:

In the IY-ASLD program, parents are introduced to strategies to increase responsiveness, reduce directiveness, and allow play to become more child-led, with the goal of making social interactions and interpersonal play more rewarding for children. Parent verbal behaviors during a free-play activity were examined, including the frequency of directive and disapproving antecedents (questions, commands, corrections, disapproving statement) and of responsive and rewarding antecedents (descriptive statements, narration, approvals, praise). Two Factors possibly contributing to changes in parenting verbal behaviors are considered: attendance in group sessions and child level of adaptive behavior as rated by the child’s teacher.

Methods:

Twenty mothers were recruited. Seventeen began and completed a 12-week IY-ASLD-T intervention delivered over HIPPA protected Zoom. Mothers were diverse ethnically, well-educated (94% college graduate), and affluent (65% reported income over $150,000 USD). All children receiving mandated speech therapy and 15 children met criteria for ASD using the Child Autism Rating Scale-2nd edition Short Form.

The present study explores pre-post changes in vocal verbal operants (VVOs) during free play sessions recorded in the home over Zoom before and after treatment. To measure the parent’s directiveness or responsiveness, each vocal emission was coded using definitions from verbal behavior theory (e.g., mands, tacts, intraverbals, approvals, disapprovals, see Table 2).

Results:

Mothers in the IY-ASLD-T program significantly decreased their frequency of directive VVOs and increased the frequency of responsive VVOs. The overall ratio of VVOs emitted by parents shifted from more directive pre-intervention to more responsive post-intervention indicating that participants developed responsive skills and reduced the number of demands placed on their child during free play. Parents of children with more severe deficits in socialization and communication on the Vineland Adaptive Behavior Scales-3 Teacher Version were more directive and less responsive overall, across both time points measured, when compared to parents of children with lesser deficits.

Conclusions:

Parent-child play interactions play a role in the development of social and communication skills. Interventions, such as IY-ASLD help parents facilitate more rewarding play interactions with their children.

Background:

Currently, we have limited ability to predict responsiveness of an individual child or family to early intervention programs (Vivanti et al., 2014); therefore, families often face an inefficient process as they begin to seek services, and may fail to find an intervention program meeting their needs. Researchers have recently increased their examination of predictors of treatment response, with the aim of better matching early interventions to key entry characteristics of children with or at elevated likelihood for autism (ELA), or their families, that account for some variability in treatment response (Fossum et al., 2018; Grzadzinski et al., 2022; Panganiban & Kasari, 2022). Sensory
hypo-reactivity and seeking have been implicated as potential moderators of communication outcomes for ELA infants (Jatkar et al., 2022) and autistic children (Williams et al., 2018).

Objectives:

To determine whether infant hypo-reactivity and seeking moderate communication outcomes in a new parent coaching intervention for families of ELA infants. Child intentional communication (IC) is a key predictor of language growth in preverbal autistic preschoolers (Yoder et al., 2015); therefore, we targeted IC as an arguably important outcome during for ELA infants.

Methods:

In the Parents and Infants Engaged (PIE) intervention, parents are coached in responding to two types of infant cues (prelinguistic communication; sensory reactivity) to facilitate dyadic engagement. Theoretically, as dyadic engagement is optimized, children can take better advantage of opportunities to learn communication skills. Families of ELA infants (11-16 months) were identified using the First Years Inventory (FYI-Lite, v3.1b; Baranek et al., 2014; 2022). Those with scores <1 SD below the mean on the Mullen Scales of Early Learning (Mullen, 1995) Expressive or Receptive Language and with elevated levels of hyper- or hypo-reactivity on the Sensory Processing Assessment (SPA; Baranek, 1995) were invited to enroll in the 12-week intervention; 36 families enrolled (n=34 had complete pretest and posttest data). IC rates were coded from 15-minute parent-child interactions by blinded coders. We ran a random intercepts mixed model predicting IC growth after 12 weeks of PIE intervention. The model included entry hypo-reactivity and seeking as predictors of IC, and interactions between time and hypo-reactivity as well as time and seeking. Sex and age at baseline were included as covariates.

Results:

IC rates increased significantly over time, $F(30) = 22.32, p < .0001$. IC was significantly associated with entry levels of hypo-reactivity, $F(30), p < .01$, but not with entry seeking, $F(30) = 2.21, p = 0.15$. Higher hypo-reactivity predicted lower levels of IC. Neither entry hypo-reactivity $F(1,28) = 1.31, p = 0.28$, nor seeking, $F(1,28) = 1.91, p = 0.18$, moderated change in IC from entry to posttest.

Conclusions:

Given the improvements in IC over the course of the intervention, coaching parents to respond to hypo-reactivity cues of ELA infants may help improve their communication outcomes. Because initial levels of hypo-reactivity and seeking in these infants did not predict IC changes during the PIE intervention, examining other potential moderators of infant communication outcomes may provide insights into which infants will benefit most from PIE.

Objectives: The current study aims to examine the effect of P-CDI on treatment gains among P4P participants, on both social skills and difficult behaviors. We hypothesized that children with greater P-CDI at baseline would exhibit less improvements than those with less P-CDI pre-treatment.

Methods: Participants included 61 preschoolers (77% male; $M_{age} = 4.7; SD = .8$) with historical autism diagnoses and SRS-2 total scores $\geq$ 60 who completed the P4P program. Each participant had a P-CDI score determined by baseline parent-reports on the Parental Stress Index – Fourth Edition Short Form (PSI-4-SF; Abidin, 2012). Higher scores indicated more dysfunctional interactions. Treatment gains were assessed using change scores between pre- and post-intervention on the Social Skills (SSiS-SS) and Problem Behavior (SSiS-PB) domains.
of the Social Skills Improvement System (SSIS; Gresham & Elliot, 2008). Pearson correlations examined the relationship between baseline P-CDI scores and treatment gains.

Results: Paired sample t-tests showed that participants significantly improved with respect to social skills, t(39)=−3.14, p=.003, and problem behaviors, t(35)=−2.70, p=.011, post-P4P. There were significant correlations between P-CDI and baseline child social functioning as measured by the SSIS-SS, r =−.31, p =.016, and SSIS-PB domains, r =.34, p =.01, such that greater P-CDI corresponded with greater baseline behavioral challenges. No significant correlation emerged between baseline P-CDI scores and treatment gains based on SSIS-SS (r =.257, p >.124) or SSIS-PB (r =.033, p =.855) change scores, suggesting that parent-child dysfunctional interactions did not predict treatment outcome.

Conclusions: These findings suggest parent-child dysfunctional interactions do not predict treatment gains in PEERS® for Preschoolers, demonstrating similar benefits following P4P irrespective of parent-child conflict. However, there does appear to be a relationship between parent-child dysfunctional interactions and child baseline social skills and problem behavior. Future work might further examine the relationship between parent and child, especially in the context of social skills groups for this young age range. Adding observational measures of parent-child interactions in addition to parent reports might add another layer for future analysis.

434.192 (Poster) Mediation of 6 Year Mid-Childhood Follow-up Outcomes after Pre-School Social Communication Therapy for Autistic Children (PACT): Randomised Controlled Trial

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Background: There are very few mechanistic studies of the long-term impact of psychosocial interventions in childhood, including autistic interventions. Such mechanistic studies are of great importance; not only to identify the ‘active processes’ by which interventions achieve their effects, but also for the insights such trial results can give into causal processes in development. A randomised controlled trial (RCT) of the parent-mediated Paediatric Autism Communication Therapy (PACT), delivered pre-school, demonstrated significant endpoint effects to reduce symptom severity on ADOS Calibrated Severity Score (CSS) and ADOS-2 total algorithm score (Pickles et al 2016; Carruthers et al. 2021). These endpoint symptom effects were strongly mediated by a midpoint-treatment effect to increase child dyadic communication initiations with the parent (Pickles et al 2014). At follow-up, 6 years after endpoint, treatment effects on child symptom and adaptive outcomes and child initiations with parent were significantly sustained (Pickles et al 2016).

Objectives: To investigate the mechanism by which the sustained effect of PACT intervention on symptom outcomes was achieved.

Methods: Of 152 children randomised to receive PACT or treatment as usual between 2-5 years of age, 121 (79.6%) were followed 5-6 years after endpoint at a mean age of 10.5 years. Assessors, blind to intervention group, measured Autism Diagnostic Observation Scale Combined Severity Score (ADOS CSS) for child symptoms and Teacher Vineland (TVABS) for adaptive behaviour in school. Hypothesised mediator was child dyadic communication initiations with caregiver in a standard play observation (Dyadic Communication Measure for Autism, DCMA). Hypothesised moderators of mediation were baseline child non-verbal developmental quotient (DQ), communication and symbolic development (CSBS) and ‘insistence on sameness’ (IS). Structural equation modelling was used in a repeated measures mediation design.

Results: Good model fits were obtained. The treatment effect on child dyadic initiation with caregiver was sustained through the follow-up period. Increased child initiation at treatment midpoint mediated the majority (73%) of the treatment effect on follow-up ADOS CSS. A combination of midpoint child initiations and direct effect of treatment also mediated the near-significant effect on follow-up TVABS. No moderation of this mediation was found for DQ, CSBS or IS.

Conclusions: Early increase in an autistic child’s communication initiation with their caregiver is largely responsible for the long-term effects from PACT therapy on symptom and adaptive behaviour outcomes. This is the first time to our knowledge that such a mediation has been shown. The finding supports the theoretical logic model of PACT therapy but also illuminates fundamental causal processes of social and adaptive development in autism over time. Early social engagement in autism can be improved with treatment. In turn such early improvement in social engagement initiated long-term generalised outcome effects on the autistic child's phenotype and adaptation.

434.193 (Poster) Modeling Heterogeneity Amongst Caregivers in Response to Caregivers Mediated Interventions
Background: Caregiver mediated interventions have grown in popularity for caregivers of young autistic children. Teaching caregivers specific strategies to help them teach their young children who are at risk or diagnosed with autism has the potential to offset some of the worry caregivers have about their children’s development as well as providing a higher dose of intervention than current practices can accommodate with community therapists. While multiple intervention models are available, only a few have demonstrated change in caregiver’s behavior and child outcomes due to the intervention. The current study is a secondary data analysis from a two-armed randomized control trial where children were randomized to one of two treatment conditions, caregiver-mediated JASPER, or psychoeducation intervention (PEI).

Objectives: To understand the fit between caregiver style of interaction and intervention approach on child outcomes. We evaluate 1) treatment and maintenance effects of caregiver strategies, 2) whether caregivers with higher strategies at baseline have better maintenance of strategies at exit to follow-up compared with caregivers’ with lower strategies, and 3) whether baseline strategies moderate the treatment effect on child joint attention.

Methods: 86 autistic participants (average age 31.5 months) and their primary caregivers enrolled in the study. On average, these children were primarily male (81%), Caucasian (63%), and recruited from the same early intervention program consisting of 30 hours per week of a combination of behavioral, speech and occupational therapies. All children were administered the ADOS to confirm autism. Caregiver JASPER strategy use was rated across the 10-min parent-child interaction. Five composite codes (%) were included in the analyses: environmental arrangement, imitation, prompting, communication and overall strategies. The Early Social-Communication Scales were administered to assess children's type and frequency of spontaneous initiations of joint attention skills (IJA) including point, give, and show. Generalized linear mixed models (GLMM) were used to model the longitudinal trajectories of the strategies and IJA, employing an identity link for continuous outcome variables and a log link function for count outcomes.

Results: Caregivers in the JASPER intervention made more gains in overall JASPER strategies (F(1,151), p<0.001) and the 4 domain strategies (environment, prompt, communication, imitation) compared to the caregivers in PEI group (F(1,151)=35.94, p<0.001; F(1,151)=56.37, p<0.001; F(1,151)=18.69, p=0.001; F(1,151)=15.47, p=0.001) respectively from baseline to exit. While caregivers in both groups regressed in overall and subdomain strategies at follow-up, caregivers in the JASPER intervention maintained more overall, communication, and imitation strategies compared to PEI group (F(1,151)=2.83, p=0.005; F(1,151)=4.32, p=0.0394; F(1,151)=6.97, p=0.009) respectively. Further, baseline caregiver strategies moderated the treatment effect of overall strategies (F(1,68)=4.70, p=0.0336, see Figure 1a) and imitation from exit to follow-up (F(1,68)=7.75, p=0.002, see Figure 1b). Lastly, caregiver’s baseline strategies moderated the effect of treatment on child’s IJA from exit to follow-up (F(1,67)=11.02, p=0.002) where JASPER children with high baseline caregiver strategies continued to improve in JA skills post exit whereas all other children did not.

Conclusions: In summary, understanding the fit between caregiver style of interaction and the intervention is important in improving intervention strategies uptake and improving child outcomes.

434.194 (Poster) Multi-Domain Assessment of Esdm Efficacy over Time: Is One Year Enough?

Background:
Early Start Denver Model (ESDM) is nowadays recognized as one of the most recommended early intervention models for young children with ASD. Intended for preschool age children (2-4 years), it is a global and intensive -15 to 20 hours per week-, developmental and behavioral program. Several studies have shown a positive impact of ESDM on developmental level, adaptive skills and language. However, response to treatment varies significantly from child to child, and the factors that determine the efficacy are still not well understood. Specially, the optimal intensity and duration of the therapy are not well described yet.

Objectives:
The objective is to characterize the longitudinal progression and performance of ASD children on several domains over the two years of ESDM intervention.

Methods:
We assessed 30 children diagnosed with ASD at three different time points during the ESDM program: at their entry (T0), after one year (T1) and at the end of the treatment two years after T0 (T2). Our ESDM program consisted of 15 hours/week of intervention. We evaluated
children’s autism core symptomatology, as well as global cognition and neuromotor skills, and performed local polynomial regression modelling to evaluate the efficacy of ESDM intervention over time on these domains.

Results:

After 12 months of ESDM intervention, children exhibited a significant improvement in social communication and interaction, whereas no change over time was observed on the level of repetitive and restrictive behaviors (RBB). On average, these children also showed a significant gain of 19 points of IQ during the same time period. This gain was similar in both verbal and nonverbal quotients. Interestingly, all these effects persisted but remained unchanged during the second year of ESDM therapy. We also found differential progression of fine and gross motricity: fine motor skills slightly improved over time, whereas gross motor skills did not change.

Conclusions:

Our findings demonstrate a strong effectiveness of ESDM to boost cognitive and social communication competences over the first 12 months of therapy. These gains are maintained during the second year. We believe that these results hint at different underlying processes taking place during the first and the second year of ESDM intervention. If confirmed, these results could be helpful for clinicians to optimize early intervention programs and adapt the treatment over time relying on progress and child’s needs.

434.195 (Poster) Naturalistic Developmental Behavioral Interventions and Augmentative and Alternative Communication for Children on the Autism Spectrum with Minimal Speech
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Background: Many children on the autism spectrum struggle to meet even basic communication needs via spoken language (Tager-Flusberg et al., 2005). Naturalistic developmental behavioral interventions (NDBIs) offer one promising avenue for supporting the language development of young children with ASD (e.g., Sandbank et al., 2020). However, children with ASD and minimal speech are less likely to benefit from NDBIs in their traditional format (Kasari et al., 2014). Without speech, these children have limited means to engage in the rich language learning environment. Augmentative and alternative communication (AAC) offers potential tools to support the early language development of young children with ASD and minimal speech (Ganz et al., 2012), and has been shown to be easily and effectively integrated into NDBI procedures (Kasari et al., 2014). However, most manualized NDBIs target spoken language almost exclusively.

Objectives: The goals of this study were twofold: (1) to bridge the NDBI and AAC intervention literature by systematically reviewing and comparing the relative impact of speech-only NDBIs and naturalistic AAC interventions that qualify as NDBIs on language growth for children with ASD and (2) to pilot test intervention procedures incorporating developmentally appropriate AAC technology within an NDBI framework for six children ages 2-5 with ASD and minimal speech.

Methods: Relevant studies for the systematic review were located through systematic database searching. The pilot testing procedures consist of an experimental single-case multiple probe across participants design (Kratochwill et al., 2010). The independent variable is the introduction of a visual scene display (VSD) AAC app during interactions with participants. The main dependent variable is the total number of unique vocabulary concepts expressed spontaneously by participants during 20-minute storybook reading sessions. Baseline sessions include NDBI procedures only, and intervention sessions add AAC.

Results: A total of 22 studies met inclusion criteria for the systematic review. The cumulative effect of interventions on language were aggregated across intervention type (i.e., NDBI-only or NDBI+AAC). These average effect sizes were used to compare the effectiveness of NDBI studies that did and did not incorporate AAC. Aggregate effect sizes for all study types were medium to very large, indicating that NDBIs with and without AAC as a component had a significant positive impact on language development. However, the cumulative effect size for NDBI studies including AAC was very large (Tau U = 0.84), while only in the large range (Tau U = 0.73) for those studies that did not include AAC as a component. As the pilot study is currently underway, definitive results are not yet available.

Conclusions: These results suggest that NDBIs that include AAC may be more effective in supporting language development for children with ASD than those that do not. Importantly, study characteristics were similar across those studies that included AAC and those that did not, suggesting that AAC may be incorporated into preexisting NDBI protocols with minimal alterations. The forthcoming results of the pilot study will provide additional evidence regarding the relative efficacy of NDBI procedures alone in contrast to when NDBI strategies include developmentally appropriate AAC systems.

434.196 (Poster) No Evidence for Sex Specific Characteristics in Autistic Children Enrolled in Autism Early Intervention Trials
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Background:

Given that Autism Spectrum Disorder (ASD) is more prevalent in males than females and females are under-represented in research, current early interventions for ASD have been developed based on the male phenotype (Benevides et al., 2020). This may be problematic, as research has pointed to potential differences in the presentations of males and females on the autism spectrum (Duvall et al., 2019; Ros-Demarize et al., 2018; Tsirgiotis et al., 2022). However, research is limited on sex-specific presentations of autism in children who enroll in early intervention programs. It is critical to examine whether females enrolled in early intervention programs present differently than males as an initial step toward determining whether current approaches to early intervention are a good fit for them.

Objectives:

We aimed to examine sex differences in a large and well-characterized sample of autistic children enrolled in early intervention trials.

Methods:

Our research question was addressed using an aggregate dataset collected for a broader study that includes child-level data for children who enrolled in evidence-based early interventions as part of their participation in early intervention trials. For the purpose of this study we analyzed baseline data for 751 males and 167 females aged 13 months to 75 months (M = 37.13, SD = 12.93) enrolled in early intervention trials across measures of a) developmental quotient (DQ) which was operationalized as the ratio between developmental age and chronological age using the Mullen Scale of Early Learning, Leiter International Performance Scale-3rd edition, Merrill Palmer-Revised Scales of Development, and Bayley Scales of Infant Development), b) adaptive functioning using the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla & Cicchetti, 2005), and c) symptom severity using the Autism Diagnostic Observation Schedule 2 (ADOS 2; Lord et al., 2012).

Results:

Since age at enrollment did not differ between males and females (p = .754, d = .14), we performed unadjusted t-tests to compare males and females across measures of verbal and nonverbal DQ, adaptive behavior, and symptom severity without adjusting for age. As reported in Table 1, no differences were found between males and females across our variables of interest (see also Figure 1).

Conclusions:

To our knowledge this is the first study to examine sex differences in a large aggregate dataset of well-characterized autistic children enrolled in early intervention trials. No sex differences were found in our sample across verbal and nonverbal DQ, adaptive behavior, or symptom severity. Although the literature informing current interventions is predominantly based on the male phenotype, the lack of differences between the male and female autistic children participating in these early interventions mitigates concerns about the appropriateness of current intervention practices for females on the autism spectrum. However, further research is needed to investigate male and female phenotypes for young children enrolled in autism early interventions across other factors not addressed in the current study (e.g., anxiety, emotion regulation).
Objectives: Online Parent Mediated Intervention for Children with ASD Program (OYNA) is a parent-mediated, online, and video-aided intervention designed to improve social communication competencies in preschool children with ASD. Families attend weekly 3-hour group sessions for 8 weeks followed by bimonthly booster sessions for 4 months (total 10 sessions). Each group consists of 10 parents (mothers and fathers). Every session follows the same procedure; in the beginning one clinician presents the strategies of the week that will be practiced at home (e.g., balanced turns, imitation) and sample videos are shown to illustrate the strategies. Between sessions, families are asked to totally do 60 minutes of daily practice. The families practice the strategies by interacting with their child throughout the week and record one sample video clip to be presented in the group session. Clinicians provide feedback for whether the parent accurately implemented the targeted intervention strategies. The aim of this study was to investigate the effect of the “OYNA” Program on ASD symptoms and on mental health of parents.

Methods: Families of a child with ASD between the ages of 18 and 60 months participated to the study. All parents (both mother and father) were asked to fill out the Social Communication Checklist (SCC), Depression Anxiety Stress Scale (DASS) and the Broad Autism Phenotype Questionnaire (BAP) both before and after the program.

Results: Parents of 75 children participated in the study. The mean age of the children was 38.2 (± 14.5) months and 68% were male. SCC total score and subscale scores (social interaction, expressive language, receptive language, imitation, and play) increased and DASS scores decreased significantly after the OYNA Program. However, BAP scores did not change after the intervention.

Conclusions: Our results are in parallel with previous studies which demonstrated improvements in children's social communicative skills, language use, and play skills and parental anxiety and stress levels.

434.198 (Poster) Parent Characteristics As Predictors of Treatment Outcome for Autistic Preschoolers Following the UCLA PEERS for Preschoolers Intervention

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Background: Research has shown that social communication differences in autistic children are apparent in early development (Paul, 2003) and can result in long term negative sequelae (Simonoff et al., 2008). Parent involvement is widely incorporated into interventions for young autistic children (Rojas-Torres et al., 2020); however, research into how parent factors impact treatment outcomes is currently limited (Shalev et al., 2019). The PEERS® for Preschoolers (P4P) program is an evidence-based social skills intervention designed for preschool-aged autistic children with concurrent parent-training in social coaching strategies to amplify and generalize child treatment gains (Park et al., 2022). Given parents’ active roles in P4P, it is essential to understand whether parent characteristics influence outcomes in the program to inform treatment planning and program implementation.

Objectives: This study aimed to examine the influence of parent characteristics in relation to treatment gains in autistic preschoolers following P4P.

Methods: Participants included 46 autistic children (Mage=4.5, SD=0.7; 78% male) and their parents who participated in the 16-week P4P intervention. Four parental characteristics were categorized into binary variables for analysis: relationship to child of participating parent (i.e., mother, father), ethnic/racial identity (i.e., White, BIPOC), parental education (i.e., graduate degree, bachelor’s or less), and marital status (i.e., married, non-married). Treatment response was assessed via parent-report, using change scores from pre- to post-intervention on the Social Responsiveness Scale, Second Edition (SRS-2; Constantino & Gruber, 2012), Social Skills Improvement System Social Skills domain and Problem Behaviors domain (SSIS-SS and SSIS-PB; Gresham & Elliott, 2008), Quality of Play Questionnaire (QPQ; Frankel and Mintz, 2008) and Parenting Stress Index, Fourth Edition, Short-Form (PSI-4-SF: Abidin, 2012).

Results: Overall, parents reported significant improvements after P4P on all outcomes, including social responsiveness (SRS-2), social skills (SSIS-SS), social engagement (QPQ), problem behaviors (SSIS-PB), and parenting stress (PSI-4-SF), ps<.05. There were no significant differences in treatment response by marital status or parental education (ps>.05). With respect to parent ethnic/racial identity, treatment response was similar for children of White and BIPOC parents on all measures except the SSIS Social Skills domain, t(37)=2.65, p=.012, on which White parents reported significant improvements on the SSIS-SS (Mchange=12.1, SD=13.4, p=.003), while BIPOC parents did not (Mchange=2.2, SD=9.7, p=.258). Finally, although both mothers and fathers reported increased playdates after P4P on the QPQ (ps<.05), fathers showed significantly greater gains in this area than mothers, t(39)=2.02, p=.05. No other differences between mothers and fathers emerged.

Conclusions: Overall, results indicate that families benefit from the P4P intervention and for a majority of outcomes, parent characteristics did not differentiate treatment response. These encouraging findings suggest diverse families largely benefit similarly from P4P. Fathers may have especially benefited from instruction in identifying playgroups and facilitating playdates given greater gains than mothers in their child’s social engagement. Discrepancy improvements in child overall social skills by parent ethnic/racial identity warrant further research.
with larger sample sizes to compare across BIPOC populations to confirm and specify differences. Additionally, investigation of BIPOC parent experiences in P4P and adaptations to enhance cultural sensitivity of P4P outcome measurement and treatment would be beneficial.

**434.199 (Poster) Parent Empowerment and Coaching in Early Intervention: Implementation Strategies to Support Caregiver Coaching in Community Settings**

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**Background:** High-quality, caregiver-mediated early intervention (EI) improves long-term outcomes for autistic children. In contrast to university-based studies of caregiver-mediated interventions, community-based EI outcomes tend to be poor, especially in low-income communities (Nahmias et al., 2019). Attenuated outcomes may be due in part to a lack of effective caregiver coaching. Community-based EI providers, particularly those working with families from marginalized backgrounds, spend most of their time working directly with the child instead of coaching caregivers in the use of intervention strategies (Pellecchia, 2022). Improving the implementation of caregiver coaching for families of young autistic children is critical to improving equitable outcomes in EI.

**Objectives:** Develop and test a toolkit of implementation strategies to improve the use of caregiver coaching for families receiving community-based EI.

**Methods:** We used community-partnered research practices with frequent input from a diverse community advisory board to iteratively develop a toolkit of implementation strategies designed to improve caregiver coaching in community-based EI. The Parent Empowerment and Coaching in Early Intervention (PEACE) toolkit is a modular toolkit of implementation strategies with three main parts: 1) an online resource library of self-paced modules, tip sheets, and infographics designed to target implementation barriers; 2) an online chat space to foster a shared learning community; and 3) twelve weekly group facilitation meetings focused on auditing of providers’ performance, feedback, and collaborative problem solving around barriers to caregiver coaching. We evaluated the toolkit’s effectiveness using a non-concurrent multiple baseline design across three groups of community-based providers and caregiver-child dyads, randomized to baseline length. We conducted direct observations of providers’ caregiver coaching fidelity weekly for twelve weeks for each dyad. We calculated effect sizes for change in caregiver coaching fidelity using the percentage of non-overlapping data (PND). We assessed changes in caregivers’ use of responsive intervention techniques using the Parenting Interactions with Children Checklist of Observations Linked to Outcomes (PICCOLO) at baseline and after twelve weeks. We evaluated providers’ perceptions of the acceptability, appropriateness, and feasibility of the toolkit using standardized measures.

**Results:** Results of the multiple baseline design indicated that EI providers’ caregiver coaching fidelity improved following introduction of the toolkit. PND for Group 1 was 100%, indicating that the PEACE toolkit improved Group 1 providers’ overall caregiver coaching fidelity (Highly Effective). PND was 73% for Group 2 (Effective) and 64% for Group 3 (Questionable). Among those providers who did not meet fidelity benchmarks, low scores were driven by variability in fidelity to specific coaching components. Caregivers demonstrated moderate growth in their use of supportive parenting techniques from the first to second observation. All providers rated the PEACE toolkit as highly acceptable, appropriate, and feasible to use, with a mean rating of 5 out of 5 for all three measures.

**Conclusions:** Our findings suggest that a toolkit of implementation strategies developed in partnership with community stakeholders and tailored to support the unique needs of community-based providers was acceptable, feasible, led to improvements in caregiver coaching, and shows promise for improving caregivers’ use of supportive parenting techniques in community-based EI.

**434.200 (Poster) Parent-Based Stress Reduction Interventions and Their Impact on Sleep Problems in Young Children with ASD**

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**Background:** The challenging behaviors common in children with autism spectrum disorder (ASD) have been associated with elevated distress among caregivers (Hayes & Watson, 2013). This includes child sleep problems, which predict elevated parenting stress even after accounting for core symptoms of ASD and demographics (Hoffman et al., 2008). This relationship is likely bidirectional as increased parenting stress is associated with worse child behavior, in general (Rodriguez et al., 2019). Stress-reduction interventions for caregivers of youth with ASD may reduce parental distress (Neece, 2014) and have a collateral benefit of improving child sleep.

**Objectives:** The aim was to longitudinally assess the impact of two parent stress-reduction interventions on sleep problems among young children with ASD, and evaluate how changes in parental stress predict changes in sleep problems over time.

**Methods:** The study utilized data from the larger Stress-reduction Techniques for Enhancing Parenting Skills (STEPS) Project, an NIH-funded randomized control trial. Subsample participants included 51 parents ($M_{age}=34.76, SD=8.18, 80.39\%$ racial/ethnic minority) of children diagnosed with ASD aged 3-5 years. Parents were randomly assigned to either an 8-week Mindfulness-Based Stress Reduction
(MBSR) intervention or Psychoeducation and Support (PE) active control intervention, and both were delivered. Assessments were conducted at baseline, immediately post-intervention, and 6- and 12-months post-intervention. Parenting stress was measured using the PSI-4 Short Form Parental Distress subscale (Abidin, 1995).

Results: At baseline, there were no significant differences in demographic variables or all sleep outcomes between groups. Two-level linear growth curve models were used to test whether there were significant changes in each of the CSHQ subscales over time, whether intervention group predicted changes in sleep problems over time, and whether changes in parenting stress predicted changes in sleep problems over time. Social Responsiveness Scale (SRS-2; Constantino, 2012) total t-scores were included as a covariate to control for ASD symptom severity. Total sleep problems ($\gamma_{10}= -.91, p < .05$), bedtime resistance ($\gamma_{10}= -.39, p < .05$), and sleep duration concerns on the CSHQ significantly improved over time ($\gamma_{10}= -.37, p < .01$). Intervention group did not predict changes over time. When the PSI parental distress subscale was entered as a time-varying covariate, total sleep problems, bedtime resistance, and sleep duration concerns on the CSHQ no longer significantly changed over time, suggesting that changes in parenting stress accounted for the observed changes in parent-reported sleep problems over the course of the interventions.

Conclusions: In both treatment groups, child parent-reported sleep improved across time, even without sleep-specific intervention. These improvements were explained by the significant reductions in parenting stress. It is possible that when parent functioning improves, there are positive downstream consequences for child functioning, although future research should better account for the passage of time and/or placebo effects. Clinicians should consider the benefits of addressing parenting stress in the context of behavioral sleep interventions for youth with ASD.

434.201 (Poster) Parent-Mediated Augmentative and Alternative Communication Interventions in Early Childhood: A Scoping Review

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Background: Parents are widely considered children’s first language teachers; however, parents of children with developmental disabilities that affect speech are less likely to spend time with their child in parent-child interaction, are less responsive to their child’s communication, are more direct when communicating, and use fewer language learning support strategies. To address these concerns, parents and caregivers of children with developmental disabilities and complex communication needs (CCN) can learn the skills and strategies to communicate with their children early using Alternative and Augmentative Communication (AAC).

Objectives: The purpose of this scoping literature review is to better understand how researchers have approached the provision of parent-mediated AAC interventions for young children, including: the characteristics of the children and caregivers included, the descriptions of the interventions utilized, the outcomes of interest, and how AAC is incorporated in the study.

Methods: A scoping review of the literature was performed. ERIC, PsycINFO, Communication & Mass Media Complete and, MEDLINE databases were searched in EBSCO and limited to peer reviewed articles, and yielded 23 results. Six manuscripts were included based on the following a priori criteria: (a) children participants were eight years of age or younger (b) parent training and/or parent implementation was present in the intervention description (c) aided AAC or SGD was utilized (d) the publication date was 2005 or later. From these articles, two ancestral articles were identified and included in the analysis.

Results: The eight articles that met inclusion criteria were read and summarized in a table utilizing the following coding categories: (a) study design; (b) type of AAC or SGD utilized (c) child participants (number, age, gender, disability; (d) caregiver description; (e) description of independent variable; (f) dependent variable; (g) if telehealth or online training was implemented and (h) What Works Clearinghouse quality rating. The articles were also coded for the level of parent involvement in the study and social validity. It was noted if the themes parent responsiveness, telehealth or online training, and naturalistic setting or elements were present in the description of the study intervention. This review found that there are very few studies reporting on parent-mediated early interventions using AAC (n = 8). The included studies found improvements in parent responsiveness and children’s improvement in communicative and social domains. Although all of the studies had elements of high-quality studies, only half of the included studies met the WWC standards without reservation (n=4). Naturalistic elements were found in five of the studies. Parent responsiveness was present in five studies as well. Telehealth was not present in any, however, an online training module was present in one.

Conclusions: There are many barriers to accessing intervention and training in AAC for families that telehealth can address. Therefore, there is a need for more research in the area of parent-mediated AAC interventions delivered by telehealth to improve accessibility and feasibility for parents of young children with CCN.

434.202 (Poster) Parent-Mediated Intervention for Children with ASD Waiting to be Enrolled in the Italian Health Services

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Background: In most areas of Italy, children with ASD receive low intensity non-specialized treatment. Despite the fact that intensive interventions are recommended, they are not usually available through State Programs. Moreover, due to the continuous increase in the number of diagnoses as well as the scarcity of specialized providers, it is very difficult for families of newly diagnosed children with ASD to access appropriate services. One way to address these issues is to teach evidence-based strategies to parents. However such an approach is rarely available in Italian health services. This is unfortunate, because teaching parents to embed learning opportunities into daily routines provides them with immediate access to effective intervention.

Objectives: This exploratory study addresses a critical public health issue in Italy as it aims to facilitate very early access to ASD evidence based intervention. A low intensity parent coaching model derived from the ESDM (P-ESDM) is introduced in a community-based early intervention program. The objective of this study is two-fold. First, it aims to teach parents strategies for helping their children develop new skills and to reduce their stress thereby enhancing family resilience. Second, it aims to improve child outcomes by delivering a model of treatment that can be initiated immediately following diagnosis, eliminating the gap in treatment that young children with ASD typically experience.

Methods: Twenty children aged 12-48 months at risk for ASD or with a diagnosis of ASD who were on a waiting list for community services were recruited for this study. The P-ESDM was delivered 2hrs per week, for 6 months. At the beginning (T0) and end of treatment (T1) a comprehensive assessment was performed using measures of parent stress level (PSI-4), measures of parent-child interaction (BOSCC, MONSI-CC), as well as developmental tests, parent interviews and questionnaires (Griffiths-III, MB-CDI, ADOS-2, VABS-II, RBS-R, SCQ).

Results: The analysis of the differences pre-post intervention was performed using paired samples t-tests. The PSI-4 showed a reduction in parents’ sense of incompetence and guilt (t=3.89; p<0.01), while the MONSI-CC showed an increase in parents’ capacity to provide opportunities of engagement for the child (t=2.38; p=0.05). Overall improvement in child social communication and developmental level was found both on the ESDM Curriculum Checklist (t=6.42; p<0.001), the BOSCC (t=2.16; p =0.05) and the Griffiths-III Age Equivalents (t=3.30; p =0.02).

Conclusions: Our findings support evidence from previous research on the efficacy and feasibility of a low intensity intervention with caregiver involvement. A controlled trial is an important next step to determine the efficacy and long-term effect of the P-ESDM in Italy. Indeed, this model has the potential of becoming a new clinical service in the Italian health system for young children with ASD.

434.203 (Poster) Parent-Mediated Interventions for Infants and Young Children with Autism Spectrum Disorder and Other Developmental Disorders: What Recent Reviews Tell Us.
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Background: Early interventions for children with Autism Spectrum Disorder (ASD) and other Developmental Disorders (DD) have been shown to be effective in improving child outcomes (Rogers et al., 2014), but many factors impede parents’ timely access to services (Helkkula et al., 2020). Moreover, the evaluation process for ASD is long to complete. The consequences of delays in intervention can be great for the child, their family and society (Horlin, 2014). As parent-mediated interventions (PMIs) can reduce these costs, they have attracted the attention of researchers, with a number offering systematic reviews of the literature and meta-analyses of PMIs and their effects on children and/or their parents.

Objectives: The current scoping review aimed to map the burgeoning literature on PMIs for infants and preschoolers with ASD and other DDs and/or their parents. Specifically, we aimed to describe characteristics of PMIs examined and the evidence of their effectiveness for children (e.g., ASD symptoms and skills). A separate investigation of the effects of PMIs on parents (e.g., parental stress and coping skills) is underway.

Methods: We conducted a search for reviews via Academic Search Complete, Education Source, ERIC, PsycNET and Medline databases. To be included, articles had to be meta-analyses, systematic or scoping reviews, published in peer-reviewed journals during the last 20 years. Additionally, the reviews had to be focused on PMIs for children (a) up to 6-years old and with (b) suspected or confirmed ASD or other DDs. The initial search yielded 90 reviews; their abstracts and methods sections (when necessary) were screened to determine eligibility. Nine reviews met all the inclusion criteria and were contained in the final analysis.

Results: Of the nine reviews, five addressed PMIs intended to affect multiple developmental domains, and four focused on a single domain (i.e., language). Several (n = 7) reviews concluded that PMIs resulted in improved child outcomes. For example, PMIs were found to reduce ASD symptoms and improve skills including language, communication, imitation, and social engagement, and some effects were substantial. In terms of intervention approaches, Pivotal Response Treatment (PRT), Functional Behavior Assessment (FBA), and Discrete Trial Training (DTT) were among those shown to be effective for targeted skills. The effects of PMIs on parental skills gained (e.g., synchrony) will also be presented. However, reviews unanimously reported great variability in the type and dosage of the interventions which limited across-study comparisons. Furthermore, many studies had methodological weaknesses, such as failing to blind participants to treatment conditions or to control for potentially confounding variables (e.g., demographic factors).
Conclusions: While many interventions have not been tested under quality experimental conditions, indicating a need for improved study designs, our review revealed some evidence of positive effects of PMIs for both child and parent outcomes. Moreover, we unearthed important recommendations for reporting on intervention characteristics, including standard reporting of frequency and length of interventions as well as child, parent and interventionist demographics. These recommendations, if followed, would allow for better comparisons of PMIs and stronger conclusions regarding their efficacy.

434.204 (Poster) Perceived Attachment in Danish Children with Autism Spectrum Disorder Associated with Parents’ Quality of Life and Use of Naturalistic Developmental Behavioral Intervention Strategies before a Parent-Mediated Autism Intervention

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Background: Having a child with autism spectrum disorder (ASD) can affect parents’ quality of life (QoL). Research indicates that securely attached autistic children can display more social competence, language skills, joint attention, and less disruptive behavior than insecurely attached peers. Some parent-mediated interventions have shown improvements in autistic children’s attachment security and studies suggest that parent-mediated naturalistic developmental behavioral interventions (NDBI) can affect positive and significant improvements in language, play, cognition, symptomatology, and social communication. However, knowledge is lacking on how perceived attachment in children with ASD, their parents’ QoL, and spontaneous use of NDBI strategies before commencing a NDBI are related. Such baseline findings are important in the future analysis of possible treatment effect moderators in a NDBI.

Objectives: I) To characterize a sample of Danish parents with a preschool-aged autistic child before their participation in a parent-mediated NDBI within a small pilot study, highlighting both their experiences with their child and NDBI strategies they may use spontaneously to support their child’s development. II) To investigate possible relationships between these characteristics.

Methods: This cross-sectional investigation assessed QoL, perception of child attachment, and NDBI strategy use in 18 Danish parents (7 fathers, 11 mothers) of 2.7-6.4 year old (Mage=4.4) children with ASD according to ICD-10 Pervasive Developmental Disorder criteria, before their participation in a parent-mediated NDBI. QoL was measured with the World Health Organization QoL Assessment-BREF (WHOQOL-BREF) using a transformed 100-point scale, attachment with the Maternal Perception of Child Attachment (MPCA) comprised of 23 questions on a 5-point Likert scale, and NDBI strategy use with the Measure of Naturalistic Developmental Behavioral Intervention Strategy Implementation-Caregiver Change (MONSI-CC), rating 20 strategies on a five-point scale. The MONSI-CC was applied to the first 10 minutes of a 12-minute video-recorded child/parent free-play interaction using a standardized toy set, in which the parent was instructed to play with their child as they “normally would”. Higher numbers indicate better scores on all three scales.

Results: Parents reported varying QoL in physical, psychological, environmental, and social relationship domains (M=74.83, SD=11.64; M=69.28, SD=17.28; M=68.50, SD=13.54; M=61.11, SD=21.39), respectively. Their mean total perception of child attachment was 76.10, SD=16.39 (range 23-115). Mean total NDBI strategy use was 15.76, SD=1.36; M=9.83, SD = 2.11 in environmental arrangement (three strategies); M=22.13, SD=1.76 in child-guided interactions (five strategies); M=26.50, SD=1.65 in active teaching and learning (seven strategies); M=5.83, SD=1.34 in opportunities for engagement (two strategies); and M=13.50, SD=0.87 in naturally reinforcing and scaffolding (three strategies). Two-tailed Pearson correlation coefficients showed significant positive relationships between MPCA Total Scores and social relationships QoL (r(17)=.73, p<.001), psychological QoL (r(17)=.54, p=.001), environmental QoL (r(17)=.73, p=.02), and MONSI-CC Active Teaching and Learning Scores (r(17)=.49, p=.04). Limitations in sample size and possible same informant bias are discussed.

Conclusions: Danish parent’s perception of their young autistic child’s attachment are associated with their QoL and implementation of active teaching strategies that support their child’s learning. These findings may predict future parent and child outcomes after participation in a parent-mediated NDBI.

434.205 (Poster) Perspectives on Behavioral Intervention Goals: Seeking Input from Autistic Adults and Adolescents

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Background: Behavioral intervention is a common intervention for autistic children. These interventions focus on teaching new skills and decreasing ‘challenging’ behaviors. Despite their popularity and extensive empirical evidence, they have received pushback from autistic advocates that these therapies cause harm due to their emphasis on normalization and compliance. However, limited empirical research exists regarding the social validity of specific intervention goals from the perspective of autistic people.
Objectives: This study aims to elicit perspectives on common intervention goals from the perspective of autistic adults and adolescents. The following research questions have guided this inquiry: 1) Which common behavioral intervention goals are seen as acceptable by autistic adults? 2) Which common behavioral intervention goals are seen as acceptable by autistic adolescents? 3) Are there differences in perspectives between autistic adults and autistic adolescents?

Methods: 235 (120F, 43M, 51 nonbinary/genderqueer, 21 other/unknown; Mage=34.36 [SD=11.13]) autistic adults took a survey evaluating 19 behavioral intervention goals. Participants rated the degree to which they agreed each goal was a good intervention goal using a 6-point Likert scale (1=strongly disagree; 6=strongly agree). The percentage of participants who endorsed the item and the mean rating were calculated for each goal statement. An exploratory graph analysis (EGA) was used to examine the structure of intervention goals and cluster them into smaller dimensions for further analysis. Hierarchical Bayesian logistic regression models were used to predict goal endorsement based on demographic variables.

The survey was adapted for the adolescent (age 13-17) group, but includes the same 19 intervention goal items. The updated survey has been evaluated by young adults (autistic and non-autistic) for face validity. The adolescent group will likely include a higher percentage of participants who have had or are currently receiving behavioral intervention, eliciting a crucial perspective. Data collection for this adolescent population is ongoing and will be analyzed in the same way as the adult population.

Results: Amongst adults, 10 goals were endorsed by a majority of participants, with reducing dangerous behaviors receiving the highest mean rating (5.4/6) and percentage of endorsement (96%). A high percentage (>90%) endorsed improving communication skills, improving quality of life, and reducing self-injurious behaviors as good intervention goals. Reducing motor stimming and reducing fixations received the lowest mean scores (1.7/6) and overall endorsements (11.9% and 9% respectively). EGA revealed three communities, which we interpreted as “Uncontroversial Goals”, “Controversial Goals”, and “Social Goals”. In terms of demographics, the only relationship that exceeded the threshold for practical significance was gender. Specifically, individuals who identified as non-binary/other gender were less likely to endorse Controversial (OR=0.189, CrI95% [0.060, 0.625], Pd=0.995, BFROPE=22.9) and Social (OR=0.247, CrI95% [0.065, 1.057], Pd=0.965, BFROPE=4.94) goals compared to males.

Conclusions: Initial analyses of the perspectives of autistic adults shed some light on which intervention goals should be addressed with autistic children. It is critical that these goals continue to be evaluated by younger populations, including adolescents, to determine if these are also the opinions of those who are more likely to be currently receiving these interventions.

434.206 (Poster) Piloting a Culturally Adapted Community-Based Parent Psychoeducational Intervention for Chinese Immigrant Families of Children with ASD
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Background:
Asian Americans are the fastest growing racial minority in US, and Chinese Americans are the largest ethnic group among them (US Census Bureau, 2017). Meanwhile, there is a steady growth of children diagnosed with autism spectrum disorder (ASD). However, Asian children with ASD are under-diagnosed and underserved compared to White children (Baio et al., 2018; Christensen et al., 2016; Son, Parish & Igdalsky, 2017). When accessing services, Chinese American families, especially newer immigrants, often face language barriers, lack of culturally appropriate services, and unfamiliarity with the complex healthcare systems (Lo, 2008; Son et al., 2017). There is a critical need for culturally appropriate interventions addressing these health disparities.

Objectives: The current study aims to present the pilot results of a culturally adapted intervention, “Parents Taking Action” (PTA. Magaña et al., 2020), for low-income Chinese immigrant families of young children with ASD in the US.

Methods:
We recruited 27 Chinese immigrant mothers of children with ASD between 2 and 10 years old to participate in the culturally adapted version of PTA, a psychoeducational intervention originally designed for Latino families of children with ASD (Xu et al., 2022). The majority (70.4%) of them live in low-income households and do not speak English well (66.7%). The majority (59.3%) of the children with ASD had severe symptoms (categorized using CARS-2). The average age of children in the sample was 5.4 years and most of them were born in the US. Four trained community health workers who are themselves Chinese mothers of children with ASD delivered the intervention online via zoom during the COVID-19 pandemic.

We collected pre and post intervention data on family and child outcomes, social validity, and attendance rate. In addition, we conducted focus groups post intervention to obtain participant feedbacks. For family outcomes, we collected family empowerment using the Family
Outcome Survey-Revised (Bailey et al., 2011), parental stress (PSI-SF, Abidin, 1990), parental self-efficacy and frequency in using evidence-based strategies (covering play skills, communication, social skills, and addressing challenging behaviors with naturalistic strategies) taught in the intervention (Magaña et al., 2020). For child outcomes, we collected child’s frequency and severity of challenging behaviors (SIB-R, Bruininks et al., 1996), social communication skills (SCQ, Rutter et al., 2007), and the number of services received. Paired-sample t-tests were performed to compare the pre and post intervention differences.

Results:

Parents reported significantly increased family empowerment (Cohen’s d=.74), increased confidence (d=1.23) and frequency (d=1.03) in using evidence-based strategies. The number of services children received also increased significantly after parents’ completion of the intervention (d=.49). Participants in the post intervention focus group reported that the intervention is feasible and acceptable.

Conclusions:

To our knowledge, this is the first culturally adapted intervention targeting low-income Chinese immigrant families of children with ASD. The pilot intervention showed promising preliminary effects in both family and child outcomes. Despite the difference in intervention modes of delivery compared to the original PTA, the intervention still showed significant increase in similar outcomes found in the original PTA RCT study (Magaña et al., 2020).

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434.207  (Poster) Positive Developmental Trajectories of Children with Autism Spectrum Disorder and Severe Intellectual Disability Following Exchange and Development Therapy

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Background: Early intervention programs positively affect key behaviours for children with Autism Spectrum Disorder. Yet, most of these programs do not target children with severe autistic symptomatology associated with intellectual disability.

Objectives:

The aim of this study was to investigate psychological and clinical outcomes of children with severe autism and intellectual disability enrolled in the Early Phase of the Tailored and Inclusive Program for Autism - Tours (TIPA-T). The TIPA-T includes in addition to individual and collective speech and psychomotor therapies and school time, the Exchange and Development Therapy (EDT). The EDT is an individual neurofunctional intervention, consisting on one-to-one exchange between a child and a therapist taking place in a pared-down environment to facilitate exchanges. It aims to rehabilitate psychophysiological abilities at the roots of social communication, through structured sequences of “social play”.

Methods:

32 children (26 males; 45 months) with ASD and with mild-to-moderate intellectual deficiency were enrolled in the TIPA-T, which comprises, weekly, 20 hours of group-based and 2 hours of one-to-one therapies including EDT during the school year. Cognitive and socio-emotional skills and general development were evaluated with the Social Cognitive Evaluation Battery (SCEB) scale and the Brunet-Lézine scale-Revised, respectively, before and after 9 months of intervention. Autistic symptomatology was evaluated with the Revised Behavior Summarized Evaluation (BSE-R) scale at 5 time points in a subset of 14 children, both in individual and group settings.

Results:

Cognitive and socio-emotional skills before therapy had average levels of 2.44 and 1.94 on a 4 -point scale, respectively. Statistically significant post-intervention improvements were found in cognitive and socio-emotional skills, with average level reaching 2.97 and 2.53, respectively. All but one child showed improvements in at least one social domain, and 78% of children gained one-level in at least 4 social domains. 29 children improved in cognitive domains with 66% of children improving in at least 3 cognitive domains. Autistic symptomatology evaluated in one-to-one settings significantly decreased with therapy (interaction deficits: -0.92; modulation deficits: -0.88), this reduction was observed in more than 85% of children. In group setting, autistic symptomatology also decreased in more than 60% of children. Global developmental age significantly increased by 3.8 months.

Conclusions:
EDT improves cognitive and social skills of most children with ASD but also core symptoms of autism, yet, with heterogeneous outcomes profiles, in line with the strong heterogeneity of profiles observed in ASD. At the group level, this study highlights the benefits of the EDT within the TIPA-T for children with ASD for severe autism associated with intellectual disability. The EDT allowed a general improvement for both cognitive and socio-emotional domains as well as a reduction in the severity of autistic symptomatology. In addition, assessment of autistic core symptoms with the BSE-R showed an improvement of social interaction, both in one-to-one and group evaluation, demonstrating the generalizability of the skills learned during the EDT.

434.208 (Poster) Predictors of Response to Early Start Denver Model: Systematic Review of the Literature and Experimental Study in 32 Young Children with Autism Spectrum Disorder.

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Background: The effectiveness of early intensive interventions in young children diagnosed with ASD is now well established, but there continues to be great interindividual variability in treatment response. Furthermore, there is a need for parameters able to predict response to naturalistic developmental treatments, like the Early Start Denver Model (ESDM), as compared to more structured and therapist-driven Early Intensive Behavioral Interventions (EIBI).

Objectives: The purpose of this study is twofold: (a) we performed a systematic review and meta-analysis of all published Literature to identify putative predictors of response to ESDM and EIBI; (b) we experimentally sought predictors of response in a sample of 32 children treated with ESDM for nine months after receiving an ASD diagnosis.

Methods: (a) four databases (EmBase, PubMed, Scopus and WebOfScience) were systematically searched and quantitative, empirical studies published in peer-reviewed journals were included if ESDM or EIBI treatment were started between the ages of 12 and 48 months. Data were meta-analyzed combining p-values according to Fisher’s method; (b) 32 children received 9 months of ESDM treatment each by a team of three certified therapists, four 90-min sessions/wk for nine months. A panel of tests was administered at the beginning (T0), after 4 months (T1) and at the end (T2) of 9 months of treatment.

Results: (a) our search yielded 1,601 articles, including 475 in WOS, 212 in PubMed, 666 in Scopus, and 248 in Embase. After study selection and the addition of eight studies found in the reference lists of selected articles, a total thirteen articles on EIBI and eleven articles on ESDM met the inclusion criteria. A set of socio-communication skills including intention to communicate, receptive and expressive language, and attention to faces, most consistently predicts response to ESDM (combined P=1.12E-11), while higher IQ/DQ at intake represents the strongest predictor of positive response to EIBI (P=8.24E-10). (b) Four children (13%) were full responders, 8 children (26%) were partial responders and 20 children (61%) were low responders to ESDM. Strongest predictors of full response are the GMDS-ER Personal-Social Scale (P=0.007) and the PEP-3 Cognitive Verbal and Preverbal scale (P=0.003). PEP-3 Receptive Language (P=0.02) and Visuo-Motor Imitation (P=0.03) are significant predictor of partial/full response.

Conclusions: Our systematic review and meta-analysis indicates that predictors of response to ESDM in very young children newly diagnosed with ASD tend to fall into the socio-communication and language domain, whereas response to EIBI seems to be better predicted by cognitive development. In line with this conceptual framework, our experimental study confirms that response to ESDM is associated with better socio-communication and receptive language skills at treatment onset. Larger samples will be necessary to reach definitive conclusions, but this systematic review and our experimental findings begin to shed some light on patient characteristics predictive of preferential response to ESDM and to EIBI, and may provide clinically useful information to begin personalizing treatment in very young children newly diagnosed with ASD.


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Background: Children with autism spectrum disorder (ASD) show characteristic deficits in social attention and interaction (Bauminger-Zviely & Shefer, 2021; Sigman et al., 1986). Preschool classrooms provide unique opportunities for scaffolding social attention and engagement (Feuerstein & Landa, 2020). Moments of social attention to peers or teachers may emerge because of generalized behavioral tendencies of the child (Constantino et al., 2017), because of classroom interventions/supports implemented by the teacher, or both.

Objectives: To investigate whether observational classroom measures of social attention are predicted by (1) eye-tracking measures of social-visual engagement (SVE), (2) parent ratings of children’s social disability, and (3) observational measures of teacher-implemented classroom supports.
Methods: Participants were children 20 to 64 months who were enrolled in three classrooms of an inclusive preschool program serving children with and without autism. ASD: n=14, Mage(SD)=43(13) months; TD: n= 18, Mage(SD)=48(10) months. Eye-tracking measures of SVE were collected while children viewed videos of naturalistic scenes of social interaction, and quantified in terms of percent gaze allocation to the faces in these scenes. Classroom videos were recorded once per week, for five weeks. For each child and recording day, a 5-minute segment of center time (i.e., indoor free-play) was selected randomly for observational coding. Social attention was coded minute-by-minute using two rating scales capturing children’s visual attention to the faces and actions of peers and teachers (Morgan et al., 2018). Classroom supports were coded using two rating scales of the Classroom Assessment Scoring System (Piattas et al., 2008) capturing the teachers’ active facilitation and supportive language use. Finally, parents completed the Social Responsiveness Scale (SRS; Constantino & Gruber, 2005), a quantitative measure of social disability.

Results: To accommodate the five repeated observational measures, data were analyzed using mixed models for longitudinal data (SAS Proc Mixed). Social attention was specified as the outcome. Predictors included (1) SVA, (2) parent-rated social disability, (3) ASD diagnostic classifications, (4) classroom supports, and (5) demographic characteristics (child age, gender, race/ethnicity). Single predictor models were specified, and hierarchically integrated as appropriate. Detailed results are presented in Table 1. Results from the final multi-predictor model show that children’s classroom social attention was independently predicted by (1) SVA, F(1,85) = 13.2, p < .001, and (2) the interaction between social disability and classroom supports, F(1,85) = 8.9, p < .01. Visual analyses of the interaction term (Figure 1) indicate that the association between classroom supports and classroom social attention was stronger in children with higher levels of social disability, compared to children with lower levels of social disability.

Conclusions: Objective, automated measures of SVE predict classroom social attention in children across a range of social disability. Future research should investigate whether SVE changes in response to intervention and/or over the course of a school year. Independently, results from this research illustrate how children’s social disability impacts the relation between classroom supports and classroom social attention. This finding suggests that teachers allocate their attention and supports to children who need them most, and the supports that they offer impact different children in different ways.

434.210 (Poster) Promoting Emotional and Behavioral Interventions in ASD Treatment: Evidence from Epigram, a Naturalistic Prospective and Longitudinal Study
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Background: Integrative care practices (ICP) in the management of autism spectrum disorders (ASD) do not currently benefit from sufficiently rigorous evaluations. In addition, they lack formalization despite their important place in clinical practice, particularly in France, where they are implemented in day hospital structures. Additionally prognostic factors from naturalistic treatment studies of children with ASD remain largely unknown.

Objectives: We aimed to identify baseline and treatment-related prognostic predictors at 1-year follow-up after Integrative Care Practices (ICP).

Methods: Eighty-nine children (3-6 years) with severe ASD were given ICP combining nine therapeutic workshops based on children’s needs. Participants were assessed at baseline and during 12 months follow-up with the Psycho-educational Profile-3-R, Children Autism Rating Scale, Parental global impression (PGI), and the Autistic Behaviors Scale. We assessed prognostic predictors using multivariable regression models and explored treatment ingredients influencing outcome using Classification and Regression Trees (CART).

Results: Multivariable models showed that being a child from first generation immigrant parents predicted worse maladaptive behaviors, whereas play activities had an opposite effect; severity of ASD and impaired cognitive functions predicted worse autism severity; and lower play activities predicted worse PGI. Regarding treatment effects, more emotion/behavioral interventions predicted better outcomes and more communication interventions predicted lower autism severity, whereas more education and cognitive interventions had an opposite effect. CART confirmed that more interventions in the emotion/behavior domain helped classifying cases with better outcomes. More parental support was associated with decreased maladaptive behaviors. Sensorimotor and education interventions also significantly contributed to classify cases according to outcomes but defined subgroups with opposite prognosis.

Conclusions: Children who exhibited the best prognosis following ICPs had less autism severity, better cognition at baseline and non-migrant parents. Emotion/behavior interventions appeared key across all outcomes and should be promoted.

434.211 (Poster) Structured Psycho-Education Intervention for Ameliorating Sleep Problems in Children with ASD
Background:

According to parent reports, the prevalence of sleep disturbances in children with autism is twice as high as that reported in typically developing children or children with other developmental delays. Previous studies have suggested that improving sleep hygiene and reducing parental involvement at bedtime may lead to improved sleep in ASD children. Here, we report initial findings from an ongoing behavioral intervention study using a structured parent psycho-education protocol.

Objectives: To examine the effectiveness of a group behavioral sleep-intervention protocol utilizing the “camping out” technique for younger children with ASD.

Methods:

To date, 56 families of 2.5-5.5-year-old children with ASD were recruited at the Azrieli National Centre for Autism and Neurodevelopment Research (ANCAN). Thirty-three families completed the intervention, 14 families dropped out and 9 families are in the final stages of the intervention. Current analyses were conducted with 24 participants. The intervention includes 2 workshops in which parents receive information about sleep disturbances and learn techniques for ameliorating sleep problems in the context of ASD. This includes ways of improving sleep hygiene and the implementation of the “camping out” technique, where parents gradually reduce their involvement in sleep onset. In addition, parents receive two phone calls per week for a period of 6 weeks with encouragement to continue applying the techniques and an opportunity to ask clarification questions. Study outcome measures are collected before the intervention and 8 weeks after the end of the intervention. Measures include: (1) Child Sleep Habit Questionnaire (CSHQ); (2) Family Inventory of Sleep Habits (FISH) (3) 5-day sleep dairy in parallel with sleep tracking device (FITBIT Charge3).

Results:

Total sleep disturbance scores on the CSHQ decreased significantly from 50.9 to 47.3 following the intervention (t(23)=2.64, p<0.01). FISH scores, increased significantly from 45.3 to 50.3 following the intervention (t(23)=5.29, p<0.01). However, there were no significant changes in sleep latency or duration according to sleep diary records (t(23)=0.05, p=0.96), (t(23)=0.47, p=0.64, respectively).

Conclusions:

These initial findings suggest that the implemented psycho-educational intervention may have improved parental perception of sleep disturbances as reported in parental questionnaires but did not reduce sleep latency or increase sleep duration as reported in sleep diaries.

434.212 (Poster) Supporting Early Social Communication Development within Family Routines – Where Do Families Need More Support?

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Background: Parent-mediated interventions (PMIs) are common intervention models; especially, when supporting children with early elevated autism risks or an early autism diagnosis. PMIs often encourage caregivers to incorporate social communication bids, responses, and scaffolding within naturalistic family routines like play or feeding. However, routines are often treated equally without consideration for which routines may warrant additional support for caregivers.

Objectives: Within a parent-mediated intervention model, identify family routines wherein additional caregiver support for social communication scaffolding is warranted.

Methods: Forty-two families with social communication concerns for their young children (aged 8 months to 5 years) participated in an ongoing family routines-based PMI. Children within this study had a confirmed autism spectrum disorder diagnosis or were awaiting diagnostic confirmation and presented with clear language and/or social concerns. Baseline data for the present study includes detailed behavioral codes of in-home recordings from four family routines (play, feeding, clothing/diaper change, and bedtime routines). All data for the present study were collected before the start of their PMI training. Data includes codes for caregiver and child communicative bids, responses, and modality (e.g., vocalization, giving, showing, deictic communication, conventional gestures). Caregiver education, and child age, sex, and developmental quotient were explored as covariates across all correlational and general linear models.
Results: Caregiver communication patterns were not correlated across the four routines (all \( p > .05 \)) and caregivers used significantly more communication bids, responses, and scaffolding during meal and bedtime routines (when compared to parent-child play and diaper/clothing change; Figure 1a). These patterns were distinctly different for children. They displayed significantly more communication during play than in the other routines (Figure 2a). For both caregivers and children gesture use was the most common during play (Figures 1b, 2b). Several additional social communication differences were present and will be further elucidated in the full presentation.

Conclusions: Within parent-mediated interventions, play interactions are often a target area for caregiver support. The present study highlights how play interactions follow a notably different pattern than other (arguably more common) routines. In particular, diaper/clothing changes had lower levels of communication for both caregivers and children making it a clear target routine for additional support. Similarly, gesture use was most common during play and additional programing/training to incorporate gestures into other family routines is supported by the present data. Future PMIs can build on this work by acknowledging multiple family routines in their targets and by structuring support to fit noted relative weaknesses.

434.213 (Poster) Supporting Teachers of Autistic Children to Promote Inclusive Education: A Feasibility Study

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Background: Research on support programmes for autistic children is typically conducted in an academic setting. Implementing these programmes in practice can pose difficulties. With support of the Flemish government, the Academic Collaborative Centre for Autism was founded. Its aim is to further develop, evaluate and disseminate support programmes for autistic individuals, which are used in practice settings. The current study focusses on a programme aimed at supporting teachers of autistic children to help the child participate in an inclusive classroom. Research has shown that including an autistic child in a classroom with typically developing peers can be challenging for the teacher, who is often in need for support to promote participation of the autistic child in the classroom.

Objectives: The aim of this study was to assess the feasibility of this programme, taking into account the perspective of teacher and counsellor.

Methods: Participants were counsellors of 84 children (64 boys) with a confirmed or preliminary diagnosis of autism. For 64 children, also teachers took part in the study. The children were between 2.5 and 7 years old \((M = 5.17; SD = 1.15)\). The individualized programme consisted of 10 sessions of 3 hours in the classroom. Depending on the goals for the child the programme consisted of psycho-education for the teacher, adapting the environment to the child, promoting communication and interaction, dealing with challenging behaviour and emotional difficulties, teaching adaptive skills, task performance, play, learning how to fill in free time and/or supporting the child during school transitions. After the last session counsellors and teachers received an online questionnaire of 26 items on the practical organization, class factors, effect on child, effect on teacher and collaboration with the teacher. The questionnaire for the teacher did not include this last category. The questions were rated on a scale of 1 to 7.

Results: Counsellors \((M = 5.35; SD = 0.80)\) and teachers \((M = 5.47; SD = 1.40)\) were on average satisfied with the practical organization of the support. The effect on the child was also rated positively by both counsellors \((M = 5.30; SD = 1.29)\) and teachers \((M = 5.61; SD = 1.37)\). This was also true for the effect on the teacher \((M = 5.39; SD = 1.28\) for counsellors and \(M = 5.07; SD = 0.99\) for teachers). Counsellors rated the feasibility to use the programme in the classroom with other children between “not sure” and “slightly agree” \((M = 4.55; SD = 1.32)\), while teachers rated these class factors more positively \((M = 5.46; SD = 1.40)\). The collaboration with the teacher was rated positively by the counsellors \((M = 5.45; SD = 1.27)\).

Conclusions: Teachers and counsellors were satisfied with the effect of the support programme on teacher and child. In most cases the practical organization did not pose many difficulties. Offering support in a classroom with a group of typically developing peers can be somewhat challenging, according to the counsellors. However, teachers saw this as less of an obstacle.

434.214 (Poster) Teacher-Implemented Early Achievements Intervention Shows Efficacy for Improving Autistic Preschoolers’ Social Communication Outcomes

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Background:

Early social and communication skills are major predictors of adult outcomes for those with autism. Early intervention (Early Achievements [EA]) implemented in a clinical setting targeting such skills improved short-term and longer-term outcomes. Few evidence-
based teacher-implemented early interventions for autistic preschoolers have demonstrated efficacy. Furthermore, research is needed to elucidate whether inclusive classrooms confer advantage relative to non-inclusive classrooms to early acquisition of social communication skills.

Objectives:

Determine whether: (1) teachers randomized to EA-focused workshops and coaching demonstrate superior EA implementation fidelity and sustainment compared to workshops only (WO) group; (2) relative to preschoolers in the WO group, EA preschoolers demonstrate superior social-communication outcomes; and (3) children in inclusive EA classrooms demonstrate superior social communication outcomes relative to non-inclusive EA classrooms.

Methods:

Teachers were randomized to the EA professional development (PD) (n=33) or WO (n=36) group. EA PD consisted of five workshops and 20 job-embedded coaching sessions. WO teachers attended five workshops unrelated to EA. EA teachers were trained to embed high-dosage instruction targeting language, imitation, joint attention, and peer-to-peer engagement in classroom group interaction contexts using naturalistic developmental behavioral intervention strategies (Schreibman et al., 2015). Participants’ baseline demographic data are presented in Table 1.

Teachers’ implementation fidelity was assessed monthly, pre-through post-PD; EA teachers’ sustainment was measured the following school year, six months post-PD. Children’s classroom-based social communication behavior was video-recorded pre- and post-PD and coded by researchers blinded to group and data acquisition timing. Distal social and language measures were administered at pre- and post-PD. 3-level hierarchical linear models accounting for clustering at the individual, classroom, and school levels assessed growth patterns. T-tests compared baseline autism symptomatology (ADOS CSS-Total) and nonverbal cognition (Mullen Scales of Early Learning Visual Reception age equivalency) for EA inclusive versus non-inclusive classrooms. Linear regression models compared child social communication outcomes in inclusive versus non-inclusive EA classrooms, controlling for baseline age and nonverbal cognition (Mullen Scales of Early Learning Visual Reception age equivalency).

Results:

At pre-PD, no group differences were detected in teacher fidelity (WO mean=32.8%, EA=29.6%). EA teachers demonstrated significantly greater gains in fidelity than WO teachers (β=0.12, p <.001). At post-PD, mean EA and WO teacher fidelity was 87.9% and 32.2%, respectively. EA teachers sustained fidelity (X ̅=81.1%).

Compared to children in the WO group, the EA group made greater pre-post gains on proximal measures of joint attention, initiation of peer engagement, and motor imitation. The EA group generalized imitation learning per their superior outcomes compared to the WO group on the distal imitation measure. See Table 2 for more results. Children in inclusive EA classrooms had higher nonverbal cognitive functioning (mean=31.28 months) compared to those in non-inclusive EA classrooms (mean=23.11 months). No significant differences were detected in social communication treatment effects in inclusive compared to non-inclusive EA classrooms.

Conclusions:

EA demonstrated efficacy for improving social communication outcomes for minimally verbal autistic preschoolers with high levels of autism symptomatology, regardless of classroom inclusion status. Findings indicate promise of scalability of teacher-implemented EA intervention for autistic 3- to 5-year-olds.

434.215 (Poster) Teacher-Implemented Social Emotional Engagement-Knowledge and Skills (SEE-KS) Intervention: Feasibility and Preliminary Efficacy in Early Childhood Classrooms

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Background: With increasing numbers of children with or at high likelihood for autism being served in inclusive early childhood education (ECE) settings, educators are challenged to meet diverse student needs. The complexity and specificity of many professional development (PD) interventions for autism, however, creates barriers to adoption and implementation. Thus, it is critical that PD interventions be developed and tested so that teachers of children with autism and social communication challenges may effectively learn to implement the intervention with high fidelity in ECE settings.
Background: As the need for accessible interventions for autism spectrum disorder (ASD) grows, telehealth intervention become an important strategy to facilitate parent’s teaching skills. With the COVID-19 public health crisis, in-person interventions have become largely infeasible during 2020-2022; therefore, it is crucial to develop an evidence-based telehealth parent-mediated intervention for young children with autism spectrum disorder with cultural adaptation. Growing studies have been explored the topic in the West. However, few studies focus on the issue in Asia area, especially in Taiwan.

Objectives: The purpose of the study was to develop a therapist-directed telehealth parent-mediated intervention for young children with autism spectrum disorder. The current report was to report initial findings of an RCT study.

Methods: Thirty-three children with ASD ages 18-48 months and their parents were randomized into the therapist-directed or self-directed groups. All of the children were diagnosed with DSM-5 and also used ADOS or ADI-R by a research team including psychiatrist, psychologist or trained graduate students in clinical psychology program. Parents in the therapist-assisted group received the website lessons and 13 weekly 1-hour coaching sessions, while parents in the self-directed group only received the website lessons. The 13 website lessons combined the rationales and teaching strategies from P-ESDM (Parent implementing Early Start Denver Model, Rogers, et al, 2012) and Project ImPACT (Improving Parents as Communication Teacher, Ingersoll & Dvorcsak, 2019). Both program manuals were translated into Traditional Chinese version and published in local publishers before the study. The first author is PI and have gotten certified ESDM therapist and ImPACT coach. The initial parental outcome measures including intervention knowledge, intervention fidelity mainly referred ESDM mode, parental stress, parenting efficacy and quality of life after intervention.

Results: Before the intervention, two groups were no difference on the above parental outcome measures. After intervention, the initial results showed (1) In terms of the primary outcomes, the parents in both groups improved significantly in intervention knowledge and implementation fidelity. Parents in therapist-assisted group have greater gains in the implementation fidelity (p < .003). (2) Regarding the secondary outcomes, there were no significant changes in parental stress, parenting efficacy and quality of life after intervention.

Conclusions: Overall, our preliminary findings revealed that telehealth parent-mediated program can increase the intervention knowledge and implementation fidelity in both groups. Additionally, therapist-assisted mode could provide more benefit for the implementation fidelity. Further studies are needed to recruit more participants and follow up the two groups to understand the intervention stability.
Background: Challenges in communication are common in autistic individuals. Though there is growing literature supporting the efficacy of naturalistic developmental behavioral interventions (NDBIs), such as Pivotal Response Treatment (PRT), for targeting communication skills, disparities in access to intervention remain a serious barrier to treatment. Advancements in technology can be used to bridge the gap in treatment accessibility for families who cannot access NDBIs. This pilot study aims to evaluate a telehealth model of PRT parent training to see if parents are able to implement PRT with fidelity after receiving virtual training and if children show improvements in functional communication skills and find the intervention acceptable.

Objectives: To evaluate a telehealth model of PRT parent training.

Methods: Twenty-one autistic children (2-6 years) with severe expressive language delays and their parents participated in this uncontrolled trial. Parents attended 12 weekly telehealth parent education sessions with a PRT-trained therapist and submitted 10-minute home videos of PRT practice before and after the study. Standardized measures such as Vineland Adaptive Behavior Scale (VABS), the MacArthur-Bates Communicative Development Inventory (CDI) Words & Gestures and the Family Empowerment Scale (FES) were used to assess child and parent outcomes. Home videos were coded to assess change in parent fidelity of implementation and child utterances. Child positive and negative affect during videos was coded as proxy for child treatment acceptability.

Results: Parent-reported communication scores on the VABS significantly increased post-intervention (t(15) = 2.80, p = 0.014), while socialization scores did not change (t(16) = 1.62, p = 0.126). On the CDI, parents reported their children were able to express more distinct words out of a list of 396 words after intervention (t(19) = 2.39, p = 0.028), and a trend toward significance was observed on receptive abilities (words understood; t(19) = 1.76, p = .094). Analysis of home videos indicated that children made significantly more utterances per minute in response to parents’ non-verbal prompts in post-intervention videos than before intervention, (t(20) = 2.72, p = .013). Though all other types of utterances (unintelligible, imitative, verbally-prompted) increased, the changes were not statistically significant. 20 of 21 parents achieved at least 80% fidelity of overall PRT implementation and most parents (16/21) implemented all six PRT principles with fidelity. Parents reported feeling greater family empowerment after intervention (t(17) = 2.19, p = .043). Children’s positive (t(20) = -.288) and negative (t(20) = .838) affect were not significantly different from pre- to post-treatment (p values > .05).

Conclusions: This study is one of the first to demonstrate the efficacy of PRT parent training via telehealth in improving child communication skills as well as parent fidelity. This study is also one of the first to look at acceptability of PRT from the child’s perspective through affect ratings. Evidence that affect did not significantly change at the group level following treatment suggests preliminary acceptability of parent implemented PRT. More rigorous research, like randomized controlled trials, are needed to better understand the impact of telehealth PRT parent training as a tool for overcoming intervention accessibility barriers.

434.218 (Poster) Telehealth Pivotal Response Treatment Parent Training: A Randomized Controlled Pilot Trial
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Background: Challenges in communication are commonly observed in children with Autism Spectrum Disorder (ASD). As literature grows supporting the efficacy of Pivotal Response Treatment (PRT) for improving social communication skills in children with ASD, access to intervention continues to be a barrier for many families. Determining the efficacy of utilizing telehealth methods to provide treatment to families is critical in improving access to care.

Objectives: The aim of this study was to conduct a randomized controlled pilot trial to examine the effects of training parents in PRT via telehealth (PRT-T) and investigate whether parents can learn via telehealth to deliver PRT in the home setting and whether their children will show greater improvement in communication skills compared to children in a waitlist control group (WL).

Methods: Recruitment for this trial is ongoing. Participants to date include 28 children with ASD, aged 2-5:11 years (M=4.09 ± 1.08 years) with significant expressive language delays and their parents. Children were randomly assigned to WL (N=14) or PRT-T (N=15). During PRT-T parents and children participated in 12 weekly 60-minute parent education sessions via secure video conference with a PRT-trained therapist. Parents completed the MacArthur-Bates Communicative Development Inventory (CDI) at baseline and week 12 and an expert clinician naïve to treatment assignment completed the Clinical Global Impression Improvement rating (CGI-I) at week 12. In addition, home videos were collected at baseline and week 12 to assess PRT implementation and change in frequency of child utterances in the home setting.

Results: Preliminary analyses reveal that children enrolled in PRT-T showed significantly greater improvement on the CDI – Words Produced Total Score between baseline (M = 129.7 ± 92.1) and week 12 (M = 192.4 ± 111.7), compared to the WL (BL: M = 45.08 ± 55.693; Wk 12: M = 48.08 ± 66.274; F = 4.306; p = 0.048). Furthermore, CGI-I ratings indicated that the PRT-T group showed more overall improvement in communication skills compared to controls (X2 (3, N=28) = 11.44; p = 0.010). Specifically, 1 child was rated as...
“very much improved” (0 in WL), 8 children rated as “much improved” (1 in WL), 6 children as “minimally improved” (7 in WL), and none rated as “no change” (5 in WL). Analysis of parent fidelity and child utterances from the home videos is in progress.

Conclusions: These preliminary data suggest that delivery of PRT parent training via telehealth is effective for improving child communication skills and may be a promising method for increasing access to evidence-based treatment for young children with ASD and their families.

434.219 (Poster) The Acceptability and Effectiveness of Caregivers Skills Training in Vietnam  
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Background:

The Caregives Skills Training (CST) Programs was developed by the World Health Organization (WHO) to target caregivers of children between 2-9 years with developmental disorders or delays. The program aims to provide caregivers with strategies to support their children’s development by engaging children in everyday activities and applying strategies to support the development of the child’s communication skills and reduce challenging behavior. Since 2019, with financial support from USAID, the Center for Creative Initiatives in Health and Population (CCHIP) has been piloting and implementing in three central provinces in Vietnam.

Objectives:

Assessing the acceptability and effectiveness of the CST program (Vietnamese version) through investigating parent’s feedbacks and measuring changes in caregivers’ knowledge and confidence, and children’s improvement.

Methods:

The study used mix-methods. WHODAS child was used to measure changes in children’s improvement and pre and post self-administered questionnaires to measure changes in caregiver’s knowledge and confidence level. A total of 179 parent-child dyad (children Mean age = 44.8, SD: 18.9 month) were enrolled in the intervention program and completed pre- and post-intervention assessment. Some care-givers were interviewed at the end of the training courses for their feedbacks on the acceptability.

Results:

After nine weeks of intervention, there were improvement in both caregiver and children’s outcomes. There were statistically significant changes in caregiver’s knowledge (17.64 score in pre vs 19.30 score at post tests), and in caregiver’s confidence (4.85 score in pre vs 8.6 score at post tests). There were significant reduction in WHODAS scores (suggesting less difficulties/improvement) on all seven domains, from 5.18 score to 14.05 score. Interviewed care-givers also reported several advantages of the program, and expressed their high acceptability to the program.

Conclusions:

There is evidence of the effects of the CST program on improving child’s outcomes in terms of communication, self-care, getting along, participation and life activities overall. Future research might explore further factors that influences the effectiveness, feasibility and acceptance of the implementing CST program at larger scale.

434.220 (Poster) The Effect of “Resilience Intervention with Parents of Children with ASD” on Parental Resilience and Well-Being and on Children’s Behavior and Emotion Regulation  
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Background:

Parents of children with ASD deal with various challenges stemming from their child’s course of development. They experience increased levels of stress, anxiety and depression as compared to parents of children with typical development (Bitsika et al. 2013). These experiences challenge their psychological resilience and well-being. Research on parent-specific interventions aimed at improving psychological resilience and well-being is scarce (Kuhlthau et al., 2020; Schwartzman et al., 2021). Furthermore, the possible impact of parental improved resilience and well-being on these children’s behavior and emotional regulation has rarely been studied. The Resilience
Intervention with Parents of Children with ASD (RIPCA) is a 17-weeks group-based program, designed to teach parents evidence-based resilience strategies, emotion regulation techniques, and child behavior management strategies. RIPCA was based on an educational resilience intervention program, that showed significant improvements in children’s stress and mood 3 months after termination of the intervention (Wolmer et al., 2011).

Objectives:
To examine the immediate and delayed effect of RIPCA on (1) parental resilience and well-being, and (2) child behavior, anxiety and emotion regulation.

Methods:
A case comparison design was conducted. Two groups of parents of preschool children with ASD (3-6 years old) were recruited. Participants assigned to either RIPCA (n=49) or Treatment as Usual (TAU) group (n=56). Both groups received individual parent training by mental health professionals working at the preschool, while the RIPCA participants also received the group intervention. Participants completed questionnaires evaluating parental resilience and well-being, and child’s anxiety, behavior, and emotion regulation. Assessments were conducted pre intervention (T1), post intervention (T2), and at follow up, 8-10 weeks after the intervention (T3).

Results:
Post intervention (T2), no significant changes were found in both groups on either parent or child measures. Interestingly, at the follow-up assessment (T3), results indicated that the RIPCA group significantly reduced parental negative relationships, an aspect of parental resilience. Parents also reported a significant decrease in children’s maladaptive behaviors (agitation and crying) and children's separation anxiety. In addition, findings in the intervention group, trending toward significance levels, were improved general parental resilience, decreased parental depressive symptoms, and decreased children's reactivity, an aspect of emotion regulation. No such changes, or any other significant changes, were found in the TAU group.

Conclusions:
results support the effectiveness overtime of RIPCA in (1) improving parental resilience and well-being among parents of young children with ASD, (2) decreasing children's maladaptive behaviors (agitation and crying), anxiety symptoms, and emotion dysregulation. These results are encouraging, as they show direct improvement in the parent as a caregiver and an indirect improvement for the child. Significant changes reported only at T3 might indicate that parents attending the RIPCA program undergo a relatively gradual internalization and implementation process of resilience tools. Further exploration of the internalization process and the differential contribution of both parental resilience and child behavior management techniques to child behavior and emotion regulation is needed.

434.221 (Poster) The Effect of Parental Involvement on the Efficacy of the PEERS for Preschoolers (P4P) Social Skills Intervention: Preliminary Results of an Israeli Randomized Controlled Trial

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Background: Many research-supported interventions for children with ASD rely on parents as key support figures, since parents are perceived as facilitators of social learning opportunities, and maintenance and generalizability of treatment gains (Siller et al.,2018). Indeed, social-skills training groups involving parents are considered the most effective treatment mode for children with ASD (DeRosier et al., 2011). The Program for the Education and Enrichment of Relational Skills (PEERS; Laugeson & Frankel, 2010) is an evidence-based parent-assisted social-skills training program for children with ASD, which has a preschooler version - PEERS for preschoolers (P4P). In the program, parents attend their own group, parallel to their children's, in which they are taught how to support the practicing of learned skills during everyday interactions with their child and to facilitate social interactions with peers for their children (Park et al., 2022). Previous studies revealed concurrent improvements in social and caregiving skills, with subsequent changes in family functioning, following the intervention (Factor et.al, 2022) which maintained at follow-up (Antezana et al, 2022). Whereas these findings add to previous reports of the effectiveness of parental involvement in children's social-skills programs, they have not directly examined the role of parental involvement in intervention-related outcomes, have not been tested through a randomized controlled trial, and have not examined generalization of gains to other social settings.

Objectives: This study aims to conduct a randomized controlled trial comparing the effects of the parent-supported P4P program to those of a P4P program with minimal parent involvement (P4P-mpi) on intervention related gains in child social-skills and generalization to school settings.
**Background:** Executive function (EF) is a series of cognitive abilities and processes for performing goal-directed behaviors. EF comprises three core EFs, namely, inhibitory control (IC), working memory (WM), and cognitive flexibility (CF), which are the foundation of higher-order EF, such as planning, problem solving, and reasoning. Children with autism spectrum disorder (ASD) experience difficulties in EF that impact their school and family lives. Given the importance of the core EFs, EF intervention may be beneficial to and necessary for children with ASD. However, few EF intervention programs have been designed to directly target the core EFs in children with ASD. Therefore, the efficacy of a core EFs-based intervention program for children with ASD needs to be examined.

**Objectives:** The aim of the study was to investigate the efficacy of an executive function intervention program (EFIP) in children with ASD aged 4 to 7.

**Methods:** Thirty-six participants (5 females) aged 4-7 (M=5.29, SD=0.98), who were diagnosed with ASD without an intellectual disability were randomly assigned to one of two conditions: P4P intervention (n=18), or a P4P intervention with minimal parental involvement (P4P-MPI; n=18), in which parents did not attend their own group, but rather received parent handouts highlighting didactic lessons. Each intervention group included up to 10 children. Conditions were comparable on age, sex, cognitive abilities and ADOS-2 scores. Participants were evaluated prior to and following the 16-week group intervention. Outcomes were assessed using parent and teacher questionnaires: Social-skills Improvement System (SSIS; Gresham & Elliott, 2008) and Social Responsiveness Scale, 2nd ed. (SRS-2; Constantino & Gruber, 2012).

**Results:** Parent reports have shown significantly improved social-skills of children on the SSIS (Fig. 1a) and increased social motivation on the SRS-2 for the P4P condition but not the P4P-MPI condition (Fig 1b).

Similarly, teacher reports have shown significantly improved social-skills on the SSIS (Fig. 1c) and improvements on the social communication index of the SRS-2 (Fig. 1d) for the P4P condition, but not for the P4P-MPI condition.

**Conclusions:** Results highlight the importance of parental involvement in child-focused social-skills interventions for children with ASD. These results also demonstrate improved generalization of learned skills to school settings when parents are involved in treatment. Lastly, these results offer preliminary support for cross-cultural effectiveness of P4P, and the first evidence for its efficacy in a randomized controlled trial.
Background: Parents of autistic children often report the absence or delay of social developmental milestones related to social skills (Martínez-Pedraza & Carter, 2009). The PEERS® for Preschoolers (P4P) Program is an evidence-based social skills intervention for preschool-aged autistic children and children with other social challenges (Park et al., 2022). Historically, P4P has been conducted in-person, which allowed clinicians to give real-time performance feedback to parents as they provided in-vivo social coaching to their children (Factor et al., 2022). However, in the wake of the COVID-19 pandemic, P4P transitioned to a parent-only telehealth delivery, requiring performance feedback to be given retrospectively during homework review of video self-modeling assignments. While telehealth outcomes for remote delivery of P4P have been promising (Factor et al., 2022), little is known about the influence of video self-modeling homework completion on treatment outcome.

Objectives: The current study aims to assess the impact of video self-modeling homework assignments of parent-child social coaching interactions on social skills treatment gains following P4P.

Methods: Participants included 30 parents and one grandparent of children between 4 and 6 years who completed the telehealth adaptation of P4P (Mchild age=4.93, SD=.83). Preschoolers presented with social difficulties and 19 had received historical diagnoses of autism (63.3%). As part of the adapted telehealth intervention, parents were required to complete weekly video self-modeling homework assignments focused on parent social coaching of targeted play skills. Parents then received performance feedback from the treatment team during homework review. Treatment outcome was assessed using the Quality of Play Questionnaire (QPQ; Frankel et al., 2010), Social Responsiveness Scale–Second Edition (SRS-2; Constantino & Gruber, 2012), Social Skills Improvement System social skills subdomain (SSIS-SS; Gresham & Elliott, 2008), and the Parenting Stress Index, Fourth Edition, Short-Form (PSI-4-SF; Abidin, 2012).

Results: The mean number of videos submitted by parents was 11.9 out of 15. Paired sample t-tests indicated scores on all SRS-2 subscales, PSI-Total, QPQ (invited and hosted playdates), and SSIS-SS significantly improved from pre- to post-intervention (all p’s values<.05). Thus, gains were observed for most P4P participants. Correlations with video self-modeling homework completion and intervention outcomes were not significant. However, the correlation between videos submitted and SRS-2 subdomain of social awareness post-treatment was trending toward significance (r=.38, p=.58), with more videos submitted suggesting greater gains. Change scores for all outcome measures were examined, though not significantly correlated with video submissions.

Conclusions: Findings suggest that overall most participants benefit from P4P using the parent-only telehealth adaptation, including the use of video self-modeling homework assignments. However, gains were not directly related to the number of videos submitted, perhaps related to the fact that parents still received exposure to clinician feedback during the viewing of other family videos. While the current study provides promising evidence for the use of novel techniques for promoting the generalization of parent social coaching outside of treatment settings, future research might examine the differences in treatment outcome when comparing video self-modeling to in-vivo performance feedback of parent social coaching.


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Background:

Previous studies have often reported that early intervention and higher baseline cognitive skills would predict more positive treatment outcomes. However, it is still not clear if any cognitive areas have the same benefit from earlier intervention. Furthermore, if earlier intervention and higher pre-treatment cognitive level have such specific impacts, it is unclear for which types of treatment these effects may be most important for.

Objectives:
Examine the influence of age at treatment start and pre-treatment developmental quotient on verbal, visual reception and fine motor abilities during community or Early Start Denver Model intervention

Methods:

Data from the Autism Early Intervention Research (AEIR) consortium was analyzed. Here we included n=429 autistic toddlers (n=342 males, n=87 females, age range = 13-60 months) from 7 different datasets with longitudinal data on early intervention. Participants received between 6-27 months of intervention with variable levels of intensity and with different intervention models that can be described as community intervention (e.g., ABA, PRT, etc) or Early Start Denver Model (ESDM). The Mullen Scales of Early Learning (MSEL) with expressive and receptive language (EL, RL), visual reception (VR) and fine motor (FM) subscales are common across all datasets. Linear mixed effect models were used to model fixed effects of treatment type, age, MSEL subscale, age at treatment start, pre-treatment developmental quotient, intensity, sex and random effects of dataset, subscale, and age grouped by subject (random slopes and intercepts).

Results:

Treatment type, MSEL subscale, and age at treatment start showed a highly significant 3-way interaction (F = 7.32, p = 6.89e-05) for predicting MSEL scores. To decompose this interaction, we split the data by treatment type and by subscale. Age at treatment start significantly affects each MSEL subscale. However, in community intervention the effect of age at treatment start is largest for both EL and RL (EL $R^2 = 0.08; RL R^2 = 0.09; p < 1.79e-09$) and also for VR (VR $R^2 = 0.05; p = 9.31e-07$), while is significantly less relevant for FM (FM $R^2 = 0.01; p = 0.01$). In contrast, in ESDM the effect of age at treatment start is much smaller and more similar across subscales ($R^2 < 0.05; p < 0.47e-03$). No difference between intervention styles were seen in the age treatment start effect, except for EL ($F = 4.86, p = 0.03$) where community intervention has more positive effect of early starts than ESDM (community intervention $R^2 = 0.08; ESDM R^2 = 0.03$). Furthermore, we found that pre-treatment developmental quotient is the characteristic that most impact all cognitive outcomes ($R^2 > 0.35$), but some difference were found between intervention styles. In ESDM the development of EL and VR skills is more influenced by pre-treatment developmental quotient

Conclusions:

These findings suggest that age at treatment start and cognitive level at the baseline are important pre-treatment predictors that may change their influence based on cognitive outcomes and intervention styles.

434.225 (Poster) The Social ABCs Parent-Mediated Intervention for Toddlers with Autism Spectrum Disorder: Feasibility and Evidence of Success in Running the Program in Goa, India.


Background:

Social ABCs is a developmentally informed, parent-mediated intervention developed in Canada to meet the need for evidence-based, manualized and sustainable intervention for toddlers with suspected or confirmed autism spectrum disorder (ASD). The two key targets of this program are directed vocal communication and positive emotion sharing with the caregiver.

Two clinicians from Sethu Centre, Goa received remote training in the Group Social ABCs Model in 2020 from the Social ABCs trainers based in Canada through weekly online supervision sessions and achieved fidelity in implementation of the Social ABCs strategies, parent coaching, training and supervised practice in coding the videos following which the first group was started in February 2021 at Sethu. To date, the Social ABCs program has supported 55 families over 10 groups at Sethu.

Objectives:

This study presents preliminary outcomes from running the Social ABCs group program at Sethu Centre in Goa, India.

Methods:

To date, 55 parent-toddler dyads have enrolled in the 6 weeks Social ABCs Group Program. The program was offered in three formats: in-person at the Centre, online, or as a hybrid format (a mix of online and in-person sessions) to make it feasible for families during COVID-19 pandemic. The program involved 6 weekly online group didactic sessions and 9 one on one coaching sessions, either in person or online.
for each dyad. The selection of the program format was done based on the imposed lockdowns at that time, the network connectivity or convenience of families of coming to the Centre and not based on clinicians’ decision on what would be the best fit for the family. Video clips of parent-child interactions were taken at baseline and in the 6th week (post training). Outcomes were measured using video-coded data to measure parent implementation fidelity and child responsivity.

Results:

Of the 55 families who enrolled, 49 finished the program while 6 families could not complete the entire 6 weeks due to commitment issues. Post 6-week training, significant improvements were observed in parent fidelity of implementation (from $M = 46.14\%$ to $77.6\%$; paired samples $t = -12.8$), child directed vocal responsiveness to parent prompts (from $M = 6.3\%$ to $45.6\%$; $t = -13.9$), and rate of child vocal initiations (from $M = 0.9$ to 3.4 per minute; $t = -4.8$), all $p$’s < .001, in line with the established Canadian data from the published RCT. Over 65% of families achieved the target of >75% fidelity.

Conclusions:

The Social ABCs Group Model shows promise as an evidence-based intervention to help improve directed vocal communication and positive emotion sharing in toddlers with ASD in Goa, India.

Our findings therefore certainly demonstrate that Social ABCs is a feasible model for parents to learn and easy to deliver in the Indian context. Bolstered by our preliminary evidence of promise, next steps include continuing to collect data that will allow us to share data from a larger sample.

434.226 (Poster) Understanding How Behaviour Therapists Use Autism Spectrum Disorder (ASD) Diagnostic Information for Intervention Planning

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Background: Behaviour therapists deliver applied behaviour analysis (ABA)-based therapies, which aim to produce socially significant changes in behaviour. While ABA-based therapies are commonly accessed by autistic children and their families, behaviour therapists are often not part of the diagnostic process. They may receive diagnostic reports from physicians, educators and other clinicians that inform their assessment. Understanding how behaviour therapists incorporate diagnostic assessments into their intervention planning will advance clinical care by identifying the most salient elements of diagnostic assessment, allowing for streamlining of assessment procedures and facilitating communication with care providers.

Objectives: The objectives are to 1) describe what information from the diagnostic assessment is received by behaviour therapists; 2) determine which elements of the diagnostic package are utilized and influence therapeutic planning; 3) identify which elements of the diagnostic package are perceived as being the most important for planning.

Methods: Using a developmental lens, a questionnaire was created to explore how behaviour therapists use diagnostic information in their treatment planning and was piloted with three behaviour therapists prior to dissemination. The cross-sectional descriptive survey was emailed electronically to behaviour therapists using registry from Ontario, Canada. Descriptive statistics were calculated to compare the frequency of information obtained and utilized to inform planning.

Results: From a public registry of approximately 200 Ontarian behaviour therapists, 88 individuals completed the survey, amounting to a response rate of 44%. Most respondents identified as women and their certification as Board Certified Behaviour Analyst (BCBA). There was variability in type of service delivery (one-to-one, mediator model/consultation), role in practice setting (implementation, development, supervision), and age of clients (preschool to high school) amongst respondents. The diagnostic information mostly frequently received by respondents included brief (68.2%) and detailed (52.3%) physician/psychologist report, DSM-5 severity level (54.5%), and speech/language assessment report (54.5%). As for the diagnostic information used to develop interventions, brief (56.8%) and detailed (48.9%) physician/psychologist report, speech/language assessment report (55.7%) and DSM-5 severity level (46.5%) were most frequently selected by respondents. Information most frequently identified as ‘absolutely essential’ to intervention planning included respondents’ own interview (75%) and their client interview (64.8%). Most respondents disagreed (37.5%) or strongly disagreed (42%) with the statement “I do not need other professional’s assessments when developing an intervention plan”. Over 70% of respondents agreed or strongly agreed that the information received in the physician/psychologist assessment report is outdated (older than six months). Finally, when asked to indicate their agreement with two statements about diagnostic assessments influencing the quantity and type of treatments provided, there was variable agreement amongst respondents (Table 1).

Conclusions: These findings demonstrate that while diagnostic assessments received by behaviour therapists are important to their planning, other independently obtained sources of information, such as client interviews, are relatively more important to this process. Of note, assessments are often outdated by the time of intervention planning, leading behaviour therapists to seek out their own information.
The diagnostic assessment is one tool to inform treatment planning; however, up-to-date information about the child’s needs is likely to be more informative, particularly across the lifespan.

434.227 (Poster) Usability Testing of Technology-Assisted Jasper Social Communication Intervention
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Background: Technology-assisted adaptations of efficacious in person early intervention programs for children with autism spectrum disorder (ASD) have the potential to conserve resources while increasing access to specialized educational services. Usability testing of online programs can support participant engagement by aligning program navigation and content presentation with the needs and preferences of the target end users.

Objectives: The objectives were to: (a) explore initial user experiences of both caregivers and practitioners through qualitative interviews and a quantitative usability questionnaire, and (b) identify program presentation and content revisions based on user feedback.

Methods: Individual usability testing sessions were conducted on Zoom and took 60-90 minutes. Seventeen participants (n=11 caregivers, n=6 practitioners) joined via computers, phones, or tablets. Practitioners were engaged in birth-six services (e.g., teachers, speech language pathologists, interventionists) and caregivers had at least one child with ASD (M=5.05 years, SD=2.62).

Each session included: (a) Think Aloud feedback interviews (Davison et al., 1997), and (b) completion of the System Usability Scale (SUS: Sauro, 2011). The session began with a brief introduction to the Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER: Kasari et al., 2021) intervention followed by exploration of two modules: (a) one content module focused on children’s development (e.g., play skills,) and (b) one core JASPER strategy (e.g., play routines) module. Participants were asked to move at their own pace, read and/or listen to the materials, and try the features (e.g., buttons, scroll, videos). They were asked to speak out loud their thoughts, comments, concerns, and questions. The interviews were video recorded and transcribed. Rapid Qualitative Analysis (Vindrola-Padros & Johnson, 2020) was applied. A summary template was developed and applied to each transcript (Hamilton, 2013). The summary information was then transferred into a data display matrix (Averill, 2002). The matrix supported a streamlined process to systematically analyze similarities, differences, and trends across participant responses (Averill, 2002).

The 10-item adapted SUS questionnaire addressed program acceptability (e.g., ease of use, challenges, and user confidence). Each question was scored from strongly agree (score of 4) to strongly disagree (score of 0). Following published scoring procedures (Brooke, 2013), the item scores were summed and multiplied by 2.5 where possible score ranged from 0-100. Scores in the 90s indicated “exceptional” user experience, 80’s “good”, and 70’s “acceptable” (Bangor et al., 2009). Both reliability of the SUS scoring and scale validity have been published (e.g., Sauro, 2011).

Results: The average SUS score for practitioners was 87.0 (SD=8.94) and the average for caregivers was 83.86 (SD=10.08). Feedback was largely positive indicating that the program was straight forward to navigate, content was valued, visuals enhanced the experience, and multiple methods to access information (e.g., listen or read) were appreciated. Suggestions for improvement included adding further video examples, reducing page scrolling, and making some activities optional (e.g., text boxes, multiple-choice questions).

Conclusions: Overall, participants smoothly navigated through the pilot materials and SUS scores (80s) indicate “good” usability of the materials. Revisions will incorporate the participants’ feedback into the program which will be pilot tested in a randomized trial.

434.228 (Poster) Using Music-Assisted Programmes (MAP) to Improve Spoken Language in Autistic Children with No or Few Words: A Feasibility Study
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Background: About 30% of autistic children do not develop functional speech, being unable to express their everyday needs using language even after years of speech, language, and educational interventions. By contrast, autistic children tend to show intact or even enhanced musical abilities. Language and communication impairments in autism are associated with reduced streamlines in the left arcuate fasciculus along the fronto-temporal pathway. However, increased activation of the left inferior frontal gyrus and preserved fronto-temporal connectivity are observed during song stimulation and listening in autism. Given the different mechanisms between music and language processing in autism, music-based interventions have potentials to induce structural and functional changes in the brain that may result in functional connectivity of the cortical networks required for normal language functioning.

Objectives: We conducted an online parent-mediated randomised controlled feasibility trial to examine whether spoken language in autism can be improved through music. The target population was 2-5-year-old autistic children with no/few words, who were given 36 target
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Virtual Implementation of Pre-K Early Literacy Intervention for Korean American and Autistic Dual Language Learners

Background: Supporting early literacy of preschoolers during the summer transitioning to kindergarten is crucial in ensuring positive social, cognitive, language, and academic outcomes. Read it again! Pre-K, a literacy curriculum, has shown improvements in vocabulary, comprehension, phonological, and print awareness for non-autistic Black and Korean American students. With a growing number of culturally and linguistically diverse students in special education, and Koreans as one of the fastest growing immigrant populations in the U.S., studying literacy intervention for Korean autistic preschoolers could be timely.

Objectives: This study evaluated the effects of a virtual and dual language implementation of Read it again! Pre-K on % responses to vocabulary and comprehension questions (Aim 1); and letter naming, phonemic segmentation, letter sounds, and word reading (Aim 2). We also explored the types and proportions of prompts that preceded students' verbal and gestural responses (Aim 3).

Methods: The study design was a single case experimental, concurrent multiple probe design. Three 4- to 5-year-old Korean autistic students met with a bilingual interventionist 2-3 times every week on Zoom. Participants completed 10-20 sessions across 4-6 weeks. Each session lasted 30 min with the Read it again! Pre-K lesson (25 min) and vocabulary/comprehension assessment (5 min). Dynamic Indicators of Basic Early Literacy Skills 8th edition (DIBELS) was administered before and after the intervention. The curriculum was modified by using (a) 10-20 out of a total of 60 lessons in the curriculum based on student preference, (b) a system of least prompts (verbal; phonemic+visual; mand) and non-contingent reinforcement (e.g., music), and (c) dual language instruction. Aim 1: Visual analysis of graphed data and calculation of effect size, Tau-U, was conducted for % responses. Aim 2: Pre- and post-intervention DIBELS raw scores were calculated. Aim 3: Average % prompts which preceded the responses were calculated.

Results: Aim 1: During baseline, all participants demonstrated 0% responses. Upon intervention, there was an immediacy of effect and high % responses (M = 95.7%) were maintained (Tau-U = 1, [1,1]). See Figure 1. Aim 2: Pre-intervention DIBELS raw scores were 0 for all participants. Participant 1’s phonemic segmentation (raw=5) and letter sounds (raw=1) and Participant 2’s letter sound (raw=3) and nonsense words (raw=1) improved after the intervention. Aim 3: Verbal prompt preceded the highest % all responses, and phonemic+visual prompts preceding the lowest % responses. Mandarin preceded the highest % verbal responses, whereas phonemic+visual prompts preceded the lowest % verbal responses. Verbal prompt preceded the highest % gestural responses, while phonemic+visual prompt preceded the lowest % gestural responses. See Figure 2.

Conclusions: Dual language and virtual implementation of a modified Read it again! Pre-K curriculum with a system of least prompts and non-contingent reinforcement had positive effects on early English literacy skills for Korean bilingual autistic preschoolers. It is important to note that virtual platform may not be accessible for all families. Resources must be available in the community for all students to access and benefit from innovative approaches to curriculum modification/adaptation that could lead to positive learning outcomes.


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Background: Despite mounting evidence of efficacy from parent-mediated interventions for toddlers with ASD, questions remain about the impact of different delivery methods and treatment components (“active ingredients”; Vivanti et al., 2018). The Social ABCs entails coaching parents to use ten antecedent and consequence strategies, adapted from Pivotal Response Treatment (Koegel et al., 2006) to foster parent-child social communication and positive affect-sharing. The program is efficacious and effective (Brian et al., 2017; 2022), but like many multi-component interventions, little is known about which components have the greatest impact on outcomes.

Objectives: To identify, among ten specific strategies: (1) differences across delivery methods/settings (in-person – coaches and families together in clinic; virtual – families in-home with virtual coaching); and (2) which of the strategies have the greatest impact on outcomes.

Methods: Families participated in group-based Social ABCs, with significant gains in overall implementation fidelity and toddlers’ social communication (Brian, Solish et al., 2022). Here we examined video-coded and self-report data from 75 families (40 in-person, 35 virtual). Analyses included (1) univariate ANOVA to examine differences in strategy use across delivery methods/settings, and (2) Pearson correlations to explore associations between use of each strategy and outcomes.

Results: (1) Parents were using some strategies before intervention and made significant gains in using all 10 strategies, p’s < .001. At baseline, the virtual setting appeared advantageous regarding parents’ spontaneous use of three strategies (pace, natural reinforcement, and reinforcing all attempts, p’s < .005); only one difference remained significant post-training (natural reinforcement, p = .002). Magnitude of change did not differ across setting for any strategy (Figure 1). (2) Collapsing across settings, four strategies were significantly positively associated with toddlers’ post-intervention responsivity: two antecedent strategies (shared control, r² = .30; clear language opportunities, r² = .32), and two consequence strategies (contingent reinforcement, r² = .60; reinforcing all attempts, r² = .30), p’s < .02. Parents’ gains in positive emotion sharing were associated with strategies of following the child’s motivation (r² = .30), gaining child attention (r² = .31), and providing natural reinforcers (r² = .38) to any attempts (r² = .31), p’s < .009. Parents’ self-efficacy was associated with increased positive emotion sharing (r² = .26, p = .05).

Conclusions: Prior to intervention, some aspects of parent-child interaction were more evident in the home environment, where parent and child may feel more comfortable, with access to familiar toys and activities. However, parents learned the strategies equally well across delivery methods/settings. Active ingredients included clear language opportunities supported by shared control of materials/activities, and contingent reinforcement of toddlers’ directed vocal attempts. Capitalizing on children’s motivation and attention, paired with natural reinforcement, fosters a positive learning context. However, these strategies alone were not enough to increase child responsivity (they may be necessary but not sufficient). Contingent reinforcement had the greatest impact on child responsivity within this positive learning context. Identification of active ingredients will help coaches to focus on training priorities with the greatest impact and promote efficiencies that maximize the feasibility and sustainability of the program.

**434.232 (Poster) A Randomized Controlled Trial of Developmental Reciprocity Treatment in Children with Autism**


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Background: Despite substantial progress in development and dissemination of early interventions to improve communication skills, there are few effective treatments for targeting core social symptoms in young children with Autism Spectrum Disorder (ASD). Developmental social-pragmatic interventions have historically aimed to improve social reciprocity directly through joining the child in play and responding to sensory needs; however, evaluation of treatment effects using standardized measures in controlled trials has been limited. Preliminary data from a previously published 12-week uncontrolled trial of Developmental Reciprocity Treatment (DRT) indicated promise for improving social and communication skills on several norm-referenced parent questionnaires.

Objectives: This presentation will review data from a new 24-week randomized controlled pilot trial comparing a group receiving DRT to a Delayed Treatment Group (DTG). DRT combined parent training in developmentally-informed methods for enhancing reciprocity and clinician-delivered in-home intervention. Our aim is to examine whether a treatment focused directly on social reciprocity will lead to benefits in social interaction skills.
Methods: Participants include 37 children with ASD, ages 2-5 years (M=47.2 ± 12.1 months). Children were randomly assigned to DTG (N=19) or DRT (N=18). DRT involved weekly parent training and 10 hours per week of in-home therapist-delivered treatment for 3 months, followed by a less-intensive phase (5 hrs per week in-home treatment and bi-weekly parent training). The primary outcome measure was the Social Responsiveness Scale-2 (SRS-2). Additional dependent measures included ratings from Structured Laboratory Observation of parent fidelity of DRT implementation by raters naïve to treatment condition [ICC (2,1) = 0.847], Clinical Global Impression Improvement (CGI-I), as well as the Brief Observation of Social Communication Change (BOSCC) and standardized parent questionnaires. Children in both groups continued stable community treatments during the trial.

Results: Examination of changes with DRT reveal that 83.3% of parents receiving DRT training met fidelity of implementation criteria (80% fidelity) at week 24. When controlling for fidelity, children enrolled in DRT showed significantly greater improvement on the SRS-2 Total T Score between baseline (M=75.3 ± 7.0) and week 24 (M=68.2 ± 7.5), compared to the DTG (BL: M=74.4 ± 11.8; Wk 24: M= 71.7 ± 9.2; F=5.000; p=0.034). CGI-I ratings indicate that the DRT group showed more overall improvement compared to controls (X2(3, N=29)= 11.507; p=0.003). Specifically, 8 children rated as much improved (1 in DTG), 5 children rated as minimally improved (11 in DTG) and none rated “no change” (4 in DTG). No significant group differences in improvement between baseline and week 24 were observed on Vineland Adaptive Behavior Scales, MacArthur-Bates Communicative Development Inventory, or on the BOSCC.

Conclusions: These preliminary data suggest that the DRT approach may be a promising intervention for improving some aspects of social functioning in young children with ASD. Significant group differences in adaptive skills and communication were not observed, suggesting that community treatments may be similarly effective for those skill areas. Future trials including larger sample sizes are warranted to replicate the findings observed in this pilot trial. Considerations for treatment design integrating behavioral and developmental intervention strategies will be discussed.

Panel Discussion — Interventions - Non-pharmacologic - School-Age, Adolescent, Adult

Panel Chair: Jonathan Green, University of Manchester, Manchester, United Kingdom

There have been increasing concerns about the quality of reporting standards in autism intervention science (https://www.spectrumnews.org/news/why-autism-therapies-have-an-evidence-problem/). Only 6/48 trials in an example systematic review (French and Kennedy 2018 https://doi.org/10.1111/jcpp.12828) met minimal standards for absence of risk of bias and Sandbank et al 2020 https://doi.org/10.1037/bul0000215 showed how trial design and reporting had a major impact on inflating treatment effect estimations. The proposal in this Panel is that all specialist Autism Journals institute full CONSORT reporting standards; with mandated publication of Trial registration, Protocols and analysis plans. The panel will debate the mechanics of this and arising concerns about practicality or that such a policy would be restrictive for early phase or exploratory studies, inequitable for low resource centres in global health, or that it would create unbalance submissions if some Journals did this and not others. Potential solutions to these concerns will be described, involving Journals acting together and incorporating existing guidelines for preliminary, proof of concept, pilot studies. The learning goals of this panel are a discussion about the issues involved for Clinical Scientists, Journals, Clinicians, Families and the Autistic Community. What is the reliability of the corpus of intervention science in the field and guidance for practice?

205.001 (Panel Discussion) Clinical Evidence and Evidenced Practice

J. Green, University of Manchester, Manchester, United Kingdom

Background: The importance of ASD as a health condition is increasingly recognised internationally in terms of population prevalence, societal awareness, and clinical and health policy priority (for instance in the WHO Mental Health Action Plan 2013-2020 and UK NHS long-term plan). Concomitantly, the demand for clinical services and the range, variety and cost of clinical support and intervention offered has mushroomed; at least in relatively high resource settings, where services offered for ASD are now a substantive part of child and adolescent mental health provision. However, an increasing concern is that the great majority of interventions currently funded and offered in health systems have little or no solid evidence base of effectiveness or safety. This despite a significant increase in the amount of intervention science reported and related practice recommendations. This situation matters for the rights and welfare of autistic people and their families, and the efficiency, and effectiveness of health systems.

Objectives: To present information on current clinical practice for ASD in the UK as an exemplar of the wider situation. To discuss now we can improve the reporting and dissemination of robust clinical science, as a first step to support ASD health systems to be more efficient, effective and cost-effective.
Methods: Review of literature on currently prevalent interventions and health system responses. Evidence from implementation science on the barriers to the incorporation of currently evidenced practice.

Results: The majority of clinical interventions in common use in the UK currently have little or no effectiveness evidence to justify their use. Some examples of recent studies and reviews will be given, including on interventions to improve anxiety, depression and other mental health outcomes (Linden et al 2022), sensory integration (Randell et al 2022), positive behaviour support (Hassiotis et al 2018, Strydom 2020), Early Bird (Dawson-Squibb et al 2019), Cygnet (Stuttard et al 2016), Ealing and HOPE models and Dynamic Risk Registers. Some of the barriers to the incorporation of interventions that do have demonstrated effectiveness – existing at a policy, management and practitioner level – will be described as identified from implementation science projects.

Conclusions: The combination of hugely increased awareness and clinical demand with a lack of robust evidence behind so much clinical intervention creates a potential crisis of clinical legitimacy. A first step to repair this situation must be the establishment of a shared robust evidence base with related practitioner and policy recommendations. Reliable standards of reporting intervention science are an essential pre-requisite for this to happen.

205.002 (Panel Discussion) Evidence-based Practice: Investigating the Extent and Impacts of Data Accessibility and Selective Reporting
M. Sandbank, The University of Texas at Austin, Austin, TX

Background: The past decade has seen an unprecedented rise in the publication of studies of interventions designed to support young autistic children (Sandbank et al., 2020). However, poor study quality and minimal reporting standards have inhibited reliable summarization of the available evidence. In addition, selective reporting practices may significantly inflate estimates of intervention effectiveness, jeopardizing the findings of meta-analyses, and producing ineffective clinical practice recommendations. The extent to which this problem manifests in studies of autism-focused early childhood interventions is unknown, but there are reasons to suspect it is rife and inappropriately influences corresponding practice recommendations.

Objectives: Estimate the extent to which poor reporting standards and data inaccessibility drive exclusion of a substantial portion of studies from autism intervention meta-analyses.

1. Determine the number and proportion of studies that show evidence of selective reporting and estimate the extent to which selective reporting significantly moderates estimates of intervention effects.
2. Generate corresponding recommendations for trial reporting and preregistration standards.

Methods: This work leverages a representative dataset of studies of interventions for young autistic children from a meta-analysis (Sandbank et al., 2020), which has been updated to include studies published before November 2021. Studies were flagged for data/author inaccessibility if they were excluded because effect size data could not be extracted, even after authors were contacted. Coders are currently documenting whether studies were prospectively registered, locating protocols, and flagging discrepancies between registration and subsequent publications. Studies associated with any of the following discrepancies will be flagged as having high risk of selective reporting bias: (a) failure to report a pre-registered outcome (nonreporting), (b) reporting of unregistered outcomes, (c) reporting an outcome as secondary which was registered as primary, (d) reporting an outcome as primary which was registered as secondary, (d) changes in assessment timepoints, (f) changes in analytic method, and/or (g) registered changes to analysis protocols that do not have an accompanying rationale.

Results: Of 393 reports of autism intervention studies that were potentially eligible for inclusion, only 290 (76%) could be meta-analyzed. Thus, nearly a quarter of available evidence was excluded, either because authors failed to report data in a manner that permitted effect size extraction or to provide such information upon request. In regards to selective reporting, results will detail the number and percentage of reports for which prospective registrations were located, as well as the number and percentage flagged for each of seven potential discrepancies outlined above. Using metaregression, I will estimate whether studies with high risk of selective reporting report significantly larger effects than studies with low or unclear risk of selective reporting.

Conclusions: The combination of hugely increased awareness and clinical demand with a lack of robust evidence behind so much clinical intervention creates a potential crisis of clinical legitimacy. A first step to repair this situation must be the establishment of a shared robust evidence base with related practitioner and policy recommendations. Reliable standards of reporting intervention science are an essential pre-requisite for this to happen.

205.003 (Panel Discussion) A Perspective from Global Health
G. Divan, Child Development Group, Sangath, New Delhi, India

Background: 95% of children with developmental disabilities, including autism, live in low and middle-income countries, where most families have little or no access to evidence based care. The majority of research in the field of autism has been focused in high-income
countries. This inequity of evidence results in interventions being transported to settings in which they have not been developed often without adaptation to the contexts in which they are being delivered. This inequity is particularly acute in intervention science; which results in the few families that may access an intervention; receiving one which is poorly evidenced, with no empirical data that it is acceptable or feasible in the settings in which they live.

Objectives: This presentation will aim to present contextual factors in the Global South which should be considered as we encourage intervention science in settings outside high income countries.

Methods: Review of literature to illustrate examples of a range of practices that can be recommendations for intervention science in low and middle-income countries

Results: Some key areas of contextual relevance while designing and conducting intervention evaluations in the low and middle-income countries include 1. Asymmetry of knowledge between research teams and the population 2. Low awareness of autism and the clustering of the less verbal phenotype in research samples 3. Stigma and discrimination around developmental disabilities 3. Differing explanatory models of a disability and hence 4. Varied expectations from interventions 5. The role of parents and extended family members in the caregiving of an individual with disabilities 6. Outcomes which matter for individuals and families 7. Pragmatic designs for interventions which are scalable in low resource settings

Conclusions: It is imperative that we strive to conduct high quality intervention science in representative populations where most of the world’s children and people with autism live. However as we design these explorations we must aim to bring on board the contextual differences in local communities such that the evidence generated has relevance and value to the communities that this science aims to serve.

205.004 (Panel Discussion) A Journal Editor Perspective

E. Anagnostou, Autism Research Centre, Bloorview Research Institute, University of Toronto, Toronto, ON, Canada; Autism Research Centre, Bloorview Research Institute, Holland Bloorview Kids Rehabilitation Hospital, Toronto, ON, Canada; Department of Pediatrics, University of Toronto, Toronto, ON, Canada; Institute of Medical Science, University of Toronto, Toronto, ON, Canada

Background: There has been an explosion of intervention studies attempting to facilitate skill acquisition, reduce impairing or distressing symptoms, and optimize biology for learning in autistic children youth and adults. Despite this, editorial boards have been struggling to balance the need for evidence to guide clinical practice, with concerns about transparency of reporting to properly evaluate the level of evidence.

Objectives: This presentation will discuss the experience of evaluating intervention studies for publication at Autism Research before and after mandating strict reporting guidelines.

Methods: Autism Research embarked on a process to address concerns about the robustness and transparency of clinical trials published in the field. We reviewed existing guidelines and editorial policies in journals that publish intervention research broadly and in ASD specifically, and considered the priorities of the INSAR scientific standards committee. We then implemented our policy that mandates pre-registration and strict CONSORT reporting for all intervention studies, and have been monitoring the impact of such policies.

Results: We will present the process by which decisions were made to establish strict reporting guidelines and will review the guidelines. We will present the impact of such policies on the numbers of studies submitted, published, geographical distribution, type of interventions involved. We will discuss the risks and benefits of such an approach from the editors’ perspective.

Conclusions: The need for robust evidence to guide intervention research is widely agreed upon but methods to ensure transparency and replicability are still being debated in the autism field. The experience of the INSAR official journal will be used to discuss implications of enforcing strict reporting guidelines and pre-registration and facilitate a discussion on scientific standards in intervention research.

ORAL SESSION — INTERVENTIONS - NON-PHARMACOLOGIC - SCHOOL-AGE, ADOLESCENT, ADULT

308 - Adolescents/Transition Age

Moderator: Ofer Golan, Department of Psychology, Bar-Ilan University, Ramat-Gan, ISRAEL

308.001 (Oral) Internet-Delivered Psychoeducation for Transition-Age Autistic Youth

A. Backman1, S. Vigerland2, A. Mellblom3, E. Norman-Claesson4, E. Sundqvist5, E. Zander6, L. Roll-Pettersson1 and T. Hirvikoski7, (1)Center of Neurodevelopmental Disorders at Karolinska Institutet (KIND), Stockholm, Sweden, (2)Karolinska Institutet, Stockholm, Sweden
Background: Transition-aged autistic youth (TAY) report low functioning and quality of life (QoL). There is a distinct lack of services targeting the transition age period, and few evidence-based internet-delivered interventions exist. SCOPE is an internet-delivered, therapist-supported, first-line psychoeducative intervention co-developed with autistic youth, provided through outpatient habilitation services context – aimed at informing about autism and transitioning issues and facilitating self-reflection and empowerment through knowledge.

Objectives: We aimed to investigate if SCOPE was superior in promoting autism knowledge (primary outcome) as well as QoL, acceptance of their autism diagnosis and mental health problems (secondary outcomes) compared to two control conditions; (1) unsupported online self-study, and (2) treatment as usual.

Methods: The current trial was a pragmatic randomised controlled trial conducted in an outpatient context from 2016 to 2020. In total, the trial included n = 144 TAY (16-25 years; M = 20.5; SD = 2.9), out of whom n = 92 (65.2%) were females. A third, 34% (n = 48) of participants had at least one other neurodevelopmental disorder (such as ADHD) and n = 41 (29.1%) had at least one psychiatric condition in addition to NDDs. Participants were block-randomized (2:1:1 ratio) to one of three trial arms: SCOPE (8 weekly internet-delivered sessions and weekly written contact with a therapist), self-study online (links to informative websites were provided weekly for eight weeks), or treatment as usual (e.g., on-going treatment of co-occurring depression or ADHD). Treatment credibility was rated as equal by the SCOPE and self-study participants when measured at baseline. Outcomes were assessed at baseline before randomization, as well as at post-treatment and 3-month follow-up.

Results: The results are as of yet unpublished. We found that both SCOPE and self-studies, but not treatment as usual, increased autism knowledge at post-treatment. However, the self-study participants’ knowledge scores returned to baseline level at the three-month follow-up. On the contrary, SCOPE participants had increased autism knowledge at follow-up compared to self-study (d = 0.53), and treatment as usual (d = 0.48). The increases in knowledge were not associated with significant changes in mental health problems at post-treatment or 3-month follow-up. Moreover, SCOPE participants reported more improved QoL at post-intervention (d = 0.37) and at 3-month follow-up (d = 0.60) than both control conditions.

Conclusions: Internet-delivered, therapist-supported psychoeducation is effective in disseminating autism knowledge and improving QoL, and the results remained or improved at the 3-month follow-up as opposed to self-study, or treatment as usual. An internet-delivered intervention enables services access to individuals who are unable or unwilling to use traditional face-to-face health care interventions, as well as to individuals who live in geographically remote locations.

308.002 (Oral) Evaluation of Virtual Interview Training for Transition-Age Autistic Youth on Twelve Social Performance Domains

K. Sherwood and M. J. Smith, School of Social Work, University of Michigan, Ann Arbor, MI

Background: Non-autistic people have a tendency to react negatively to autistic individuals’ basic social performance (e.g., eye contact, intonation, social connection) during casual conversation, which has been unfairly judged as socially unacceptable. These tendencies also extend to more formal conversations like job interviews. Recently, a novel job interview intervention demonstrated effectiveness at enhancing specific job interview skills, but has not yet been evaluated for whether its effectiveness generalizes to basic social performance.

Objectives: This study analyzed secondary data from a completed randomized controlled trial (RCT) to evaluate whether Virtual Interview Training for Transition Age Youth (VIT-TAY, an internet-delivered job interview simulator with automated feedback) was associated with unanticipated improvements to basic social performance among autistic transition-age youth.

Methods: A recent RCT revealed that 48 autistic transition-age youth randomized to receiving pre-employment transition services (Pre-ETS) with VIT-TAY improved their job interview skills as compared to 23 autistic transition-age youth receiving Pre-ETS only. Participants in this parent RCT completed video-recorded job interview role-plays at pre- and post-test that were blindly rated for strength of 10 specific interview skills. For the current study, our team blindly re-rated these interview role-plays using an adapted version of the Social Skill Performance Assessment (SSPA) 2.0 rating scale. The SSPA assesses 12 domains of basic social performance: interest, fluency, clarity, focus, intonation/pattern of speech, body language, facial expression, eye contact, reading social cues, connection, overall conversation, and social appropriateness. We then used repeated measures analyses of variance (RM-ANOVA) to conduct an evaluation of whether the Pre-ETS+VIT-TAY group improved in their domains of basic social performance between pre- and post-test as compared to the Pre-ETS only group.

Results: The RM-ANOVA results revealed that the Pre-ETS + VIT-TAY group had significant increases in three domains of general social performance as compared to Pre-ETS only. Specifically, we found significant group-by-time interactions for the domains of intonation/pattern of speech (F1,68 = 4.21, p < 0.05), connection (F1,68 = 6.04, p < 0.05), and overall conversational ability (F1,68 = 4.67, p < 0.05).
Background: Autistic people are often skilled with computers and drawn to STEM fields (Wei et al., 2013) yet encounter difficulties obtaining employment (Shattuck et al., 2012). Strategies to help neurodivergent youth engage with STEM curricula to build employment-related skills are sorely needed. Training for staff who facilitate such programs should prioritize improving staff autism understanding and strengths-based practices (Beverly & Mathews, 2021).

Our research was designed with a participatory team and an informal educational non-profit. Staff facilitated a four-week workshop for autistic youth that sought to teach game design and workforce readiness skills. By triangulating parent and student motivations and workshop ratings with educators’ ratings of instructional strategies, we identify opportunities to improve programming.

Objectives:

1. Evaluate student and parent motivations for participating in the workshop and perceived gains.
2. Assess staff perceptions of workshop effectiveness in achieving learning objectives (LOs).

Methods: Students (n=22) and their parents were surveyed before and after a four-week game design and employment workshop (Table 1). Assessments included a measure of computational thinking (CT; Wiebe et al., 2019), and items to assess student and parent motivations for attending/encouraging their child to attend and perceived gains following the workshop.

Five staff members (one social worker, one occupational therapist and three counselors) were surveyed each Friday of the workshop. Staff were asked to rate two questions for each of five LOs (Table 2).

Results: Students and parents aligned in their motivations for enrolling in the workshop across many areas, including learning computer, game design, and job skills. Parents were more interested in students learning self-advocacy and collaboration skills (p=.04) than students (Table 1). When surveyed post-workshop, students and parents aligned in how much they felt the workshop helped them gain each target skill, with no differences between groups. The student CT assessments showed no improvements after workshop participation (p=.75).

Weekly staff surveys were consistently positive, indicating staff felt teaching methods were effective in teaching LOs to most students and that staff felt their training supported them in achieving LOs. However, review of open-ended feedback from staff revealed that they felt additional training, in effectively working with autistic students and more time dedicated to reviewing CT curriculum prior to instruction, were required to feel equipped to meet workshop objectives.

Conclusions: Although ratings of perceived workshop gains were generally above neutral, results suggest discrepancies between students’ and parents’ motivations for participation and perceived gains. Although direct comparisons are not possible given different rating scales, staff consistently rated instructional strategies more effective in teaching employment-related LOs than parents’ and students’ post-workshop ratings indicated. Reasons for discrepancies may include: (1) skills like time management and self-advocacy were not modeled consistently by staff during workshop administration, (2) curriculum delivery emphasized tech-focused more than employment-focused content, despite agreement that all LOs were equally important to the success of the workshop during planning phases. Tech-focused instruction primarily focused on project completion rather than foundational CT skills. Findings highlight the need to listen to stakeholders to improve employment curriculum for autistic youth.
Background: Accessing needed services and supports is a challenge for many autistic youth as they transition to adulthood. To address this issue, we developed ASSIST (Advocating for Supports to Improve Service Transitions) – a group-based intervention that teaches parents how to advocate for adult services on behalf of their transition-aged autistic youth – and are testing the program in a multi-site randomized-controlled trial. Previous research suggests that participating in ASSIST increases parents’ knowledge of adult services and advocacy skills.

Objectives: Does participating in ASSIST increase service access, as evidenced by receipt of direct services and government programs that fund those services? Given differences between school-based and adult service systems, does the impact of ASSIST on service access depend on whether the autistic youth is in high school?

Methods: 185 caregivers of autistic youth were recruited from study sites in three states in the US (Illinois, Tennessee, Wisconsin). Caregivers were primarily mothers (89.7%) and white, non-Hispanic (84.3%). Autistic youth ranged from 16 to 26 years old (M = 20.1), 75.1% identified as male, 40% had an intellectual disability, and 60.5% were enrolled in high school.

Participants were randomized to either treatment or control conditions. The treatment group participated in ASSIST, meeting weekly (2 hours/week) for 12 weeks. Topics included services and supports related to employment, education, independent living, community participation, and health insurance. Control group participants received all written materials shared with the treatment group. Information on service access was collected prior to randomization and 6-months after the treatment group finished ASSIST. Receipt of direct services was measured by asking parents whether their son/daughter was receiving each of 20 services (e.g., speech/language, transportation, psychological/mental health). Access to government programs was measured by asking parents whether their son/daughter was receiving each of 10 government programs (e.g., SSI, Medicaid waiver services, vocational rehabilitation). Counts of direct services and government programs received were generated at baseline and 6-month follow-up. Analysis of covariance was used to examine whether there were treatment effects on 6-month service receipt after controlling for baseline services; service access was examined for the full sample, as well as for those in (n = 95) and out (n = 67) of high school in separate models.

Results: 162 participants (88%) completed the 6-month follow-up. There were no treatment effects on government programs or direct services in the full sample. However, there was a marginally significant effect of treatment on government programs (but not direct services) for those out of high school, F(1,64) = 3.88, p = .05. Controlling for baseline, treatment group families whose youth was out of high school were receiving an average of 3.8 government programs, compared to 3.3 in the control group.

Conclusions: Providing comprehensive information about adult services may be more effective when youth are out of high school and families can immediately apply the information. Further, access to government programs that fund direct services may not quickly translate to increases in the services themselves. Ongoing analyses will examine service access 12-months after the treatment group took ASSIST.
This study aimed to determine whether RUBI is feasible for use with autistic adults and their caregiver(s) and if participation in RUBI leads to decreases in challenging behaviors and increases in independence for the autistic adult.

Methods:

Using a case study design, we evaluated the preliminary feasibility and acceptability of RUBI with four autistic adults and their caregivers. Trained therapists delivered RUBI in weekly sessions with families to teach skills during 11 core sessions, up to two optional supplemental sessions, and a booster session 1-month post treatment to foster skill generalization and maintenance. Attrition and therapist adherence to the RUBI manual, as well as the RUBI Parent Satisfaction Questionnaire, were examined as measures of feasibility and acceptability. The Aberrant Behavior Checklist (ABC) and Home Situations Questionnaire (HSQ) were collected at pre-treatment, post-treatment, and follow-up (one month after post-treatment) as preliminary outcomes of challenging behavior.

Results:

Results support preliminary feasibility and acceptability, as indicated by low attrition (0%) and high adherence to the RUBI manual (89%). Following intervention, all participants demonstrated decreased levels of challenging behaviors (30-50% decreases in ABC and HSQ) and increased self-reported independence. Additionally, parents reported that the number and length of sessions was acceptable, the session content was appropriate, and that they felt more confident in managing their adult child’s behavior since participating in the program. However, parents reported that wished certain aspects of the program (e.g., videos, vignettes) were more tailored to adults specifically.

Conclusions:

With limitations in mind (i.e., small sample size, lack of study control, etc.), the current case study provides impetus for further evaluation of RUBI for autistic adults and their families. RUBI offers a manualized intervention that can be disseminated into multiple settings once appropriate adaptations can be identified. Further, RUBI holds practical benefits when compared with more intensive approaches to address behaviors, representing a more easily accessible intervention that caregivers can implement at home and in public settings with relatively infrequent clinical contact (i.e., weekly outpatient appointments). Future research should aim to: (a) develop intervention adaptations for autistic adults; and (b) systematically evaluate which aspects of RUBI produce desired outcomes for this population.
The findings suggest that group treatment can work for patients with ASD and co-occurring SUD. Lower levels of alcohol use ($t = 3.61, P = .002, d = 0.75$), craving ($t = 2.65, P = .013, d = 0.51$), passive coping styles ($t = 2.32, P = .030, d = 0.48$), depression ($t = 3.48, P = .002, d = 0.67$), anxiety ($t = 3.02, P = .006, d = 0.58$), and stress ($t = 2.62, P = .015, d = 0.51$) symptoms were reported after completing the group intervention, with even stronger effects at 3 months follow-up.

Conclusions:

An interesting finding of our study is that the alcohol use of clients decreases significantly after the group intervention, while the use of cannabis remains unchanged. The results of this naturalistic pre-post intervention study should be interpreted with caution, as our sample size was quite small ($N = 57$) and we did not include a control group. In the future, we hope to expand our research and look at the effects of different types of substances and the effects of including a ‘buddy’ regarding generalizability. Qualitative research regarding the experiences of clients will also be conducted. Overall, the present study shows promising results of a tailor-made group intervention in a heterogeneous patient population with ASD and co-occurring SUD with positive effects on both symptoms of ASD and SUD.

405.271 (Poster) A Comparative Analysis of Autism Aspectss Design Index and Deafspace Design Guidelines

H. Bauman, MIXdesign, New York City, NY

Background:

This presentation chronicles the parallel development of the Autism ASPECTSS™ Design Index and Gallaudet University’s DeafSpace™ Design Guidelines and their application to architectural design. A comparative analysis including case studies from the Autism Friendly Design Guide for Dublin City University and DeafSpace projects on the Gallaudet campus demonstrates how architecture facilitates intersecting needs of different populations. For example: Escape Space, one of the seven ASPECTSS criterion providing respite for the autistic user from environmental over-stimulation shares similar design recommendations for light, acoustics, and interior finishes recommended by the DeafSpace Design Guide for Conversation Eddies—spaces optimized for visual communication and reduced eye fatigue for deaf signers. Insights like these and user-centered methodologies will be presented to model means and benefits of intersectional design.

Objectives:

ASPECTSS and DeafSpace initiatives share key objectives: 1) to develop inclusive research and design methods attuned to the specific needs unique to each user group, 2) to prioritize inclusive design processes customized to specific project parameters of physical place, user community, and function over the use of design standards, and 3) to develop and disseminate performance-based guidelines in an accessible format mediating vastly different perspectives of users and design professionals.

Methods:

This work highlights how ASPECTSS modifies the Design Thinking framework for greater accessibility for autistic users and compares it with the DeafSpace community-based research method focused on visual communication and space. For example, one ASPECTSS line of research recorded how users occupied various spatial arrangements over time to understand and validate the ways spatial compartmentalization reduces anxiety. Another DeafSpace investigation explores the experiential dynamics of environmental stimuli and visual communication while moving through space using videos recorded with body mounted cameras. The comparative analysis identifies similarities and differences in design outcomes from both the autistic and deaf perspective validated through lived experiences within completed projects.

Results:

Both ASPECTSS and DeafSpace Design Guidelines document findings within a performance-based design guideline. ASPECTSS identifies seven general criteria: Acoustics, Spatial Sequencing, Escape Space, Compartmentalization, Transitions, Sensory Zoning, and Safety as an integrated set of strategies for building choice into the built environment for modulating sensory input. Similarly, the DeafSpace Guidelines articulate socio-spatial conditions optimizing spatial proxemics, light, color, acoustics, and vibration within spaces to optimize acuity of visual language and spatial orientation necessary for a sense of safety and wellbeing. ASPECTSS and DeafSpace guidelines have informed the design of completed building projects which will be presented as case studies demonstrating how inclusive user-driven research and design result in more inclusive and accessible buildings for a majority of individuals.

Conclusions:

Life experiences of the autistic and those who are deaf are distinctly different, yet investigation reveals affinities in their relationship to space calling for a more intersectional as opposed to traditional siloed approach to accessible design. This comparative analysis validates
the need for user-driven design methodologies customized to the needs of specific user groups and for understanding how the needs of different user groups complement one another and inspire a more accessible environment.

405.272 (Poster) A Parent-Led Intervention to Reduce Anxiety in Autistic Children with Severe to Profound Intellectual Disabilities: Current Data from the Ladders Pilot Study
J. Waite, E. Pearson, J. Tarver, J. Hughes, G. Edwards and C. Greenhill, Aston University, Birmingham, United Kingdom

Background: Autistic individuals with severe to profound intellectual disability (ID) are at greater risk of experiencing anxiety. However, there is a lack of evidence-based interventions aimed to reduce anxiety and anxiety-related avoidance behaviour in this group, which is concerning given the elevated mental health difficulties. Psychological approaches such as graded exposure and emotion regulation have been evidenced as effective in gradually reducing anxiety in other clinical populations. Additionally, gradual exposure techniques can reduce escape-maintained behaviours in severe to profound ID. Therefore, it is likely that a combination of these approaches may also be effective and appropriate for autistic individuals with severe to profound ID who experience anxiety.

Objectives:

We have developed LADDERS, a 16-week parent-led intervention comprising of psychoeducation, graded exposure-based tasks and skills building, delivered using a person-centred approach. This pilot study aims to assess whether LADDERS reduces anxiety and avoidance-related behaviour in autistic children with severe to profound ID.

Methods: The study utilises a multiple baseline, single case experimental design. Potential participants were screened according to eligibility criteria and proceeded onto baseline assessment if eligible. After baseline, participants completed the LADDERS intervention. The primary outcome measure (POM) is parent report of child anxiety completed daily from baseline throughout intervention and 2 weeks post-intervention. Secondary outcome measures (SOM) include direct observation of child anxiety, teacher report of anxiety and parent-report questionnaires for mood and behavioural markers of anxiety in their child. All questionnaire measures are validated for use in severe to profound ID and are completed pre-intervention, post-intervention (week 16) and at a 2-month follow up (week 24).

Results: Six parent-child dyads were eligible to proceed from baseline assessment with a 100% retention rate. Post-intervention POM data were available for 3 out of 6 participants at time of analysis. Visual inspection of POM data suggests a decrease in reported anxiety for 2 out of 3 participants, with the third showing a stable trend. Statistical comparison of pre- and post-intervention POM for the 2 participants with decreasing trends was conducted using Non-overlap of all Pairs (NAP), which is appropriate for smaller datasets. NAP effect sizes were 0.70 and 0.79, which are deemed medium effect sizes. Further NAP analysis of POM for the whole sample will be conducted alongside analysis of SOM to further examine the effectiveness of the LADDERS intervention.

Conclusions: Based on preliminary data the effectiveness of the LADDERS intervention at reducing anxiety and anxiety-related avoidance in autistic children with a severe to profound ID looks promising.

405.273 (Poster) A Pilot Trial of SPACE (Supportive Parenting for Anxious Childhood Emotions) in Autism
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Background:

Family accommodation (FA) describes the phenomenon in which parents make changes to their own behavior to help their child avoid or alleviate distress caused by a disorder (Shimshoni et al., 2019). In anxiety disorders, studies have shown that while FA alleviates distress in the short term, it associates with more severe symptoms, greater functional impairment, poorer treatment outcomes, increased caregiver burden and disruption to family functioning in the long term (Lebowitz, 2013; Lebowitz et al., 2014; Shimshoni et al., 2019). Recent literature shows high prevalence of FA in comorbid cases of autism and anxiety, with over 97.5% of parents of children with autism and anxiety participating in different studies reporting engaging in at least one form of FA at least once per week (Adams & Emerson, 2020; Frank et al., 2020; Storch et al., 2015). In autism, the most common forms of treatment for anxiety are cognitive behavior therapy (Frank et al., 2020; Storch et al., 2015; Vasa et al., 2020) and medication (Nadeau et al., 2011). These treatments do not target FA and, although they have been found to be effective, they are not always applicable. Supportive Parenting for Anxious Childhood Emotions (SPACE) is a novel parent-based manualized treatment for anxiety and OCD specifically targeting FA (Lebowitz, 2013; Lebowitz et al., 2014). SPACE has been shown to be an acceptable and efficacious treatment for childhood anxiety disorders (Lebowitz et al., 2020). The intervention protocol includes 12 weekly, 60-minute sessions aimed at systematically monitoring and reducing FA while increasing parental support of the child's ability to cope with anxiety (Lebowitz & Majdick, 2020; Lebowitz & Shimshoni, 2018).
Objectives: This pilot trial aimed to assess the feasibility, acceptability, treatment-satisfaction, and preliminary efficacy of SPACE for anxiety in autism.

Methods: Parents of 15 children (ages 6-10) diagnosed with autism and presenting high levels of anxiety participated in 13 weekly sessions of SPACE. Feasibility and acceptability were assessed by calculating enrollment, attendance, attrition, and adverse events. Treatment-satisfaction was assessed with the Client Satisfaction Questionnaire (CSQ-8), administered posttreatment. Anxiety symptom severity and FA were assessed at baseline, posttreatment, and at 2-month follow-up.

Results: Of 26 eligible families, 22 (84.62%) elected to participate in the trial. Of the 22 participating families, 15 (68.18%) completed all 13 weekly treatment sessions. Parents rated the treatment as highly satisfactory (CSQ-8: M = 28.4, SD = 3.29, out of a maximum score of 32). Dropouts reported personal reasons for terminating treatment and did not report any adverse events or effects related to treatment. One family reported an increase in child depressive thoughts and moods during and immediately after treatment, and another family reported manageable tantrums and heightened anxiety during treatment. Anxiety symptom severity and FA were significantly reduced from pre- to posttreatment and this reduction was maintained at 2-month follow-up.

Conclusions: This study provides preliminary evidence that SPACE, a parent-based treatment that focuses on parental responses to anxiety symptoms, is feasible, acceptable, and satisfactory and produces improvement in clinical outcomes in the autistic population.

405.274 (Poster) A Randomised Controlled Effectiveness Trial of Sensory Integration Therapy Plus Usual Care Versus Usual Care Alone for Autistic Children with Sensory Processing Difficulties (SenITA)
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Background: At least 90% of autistic children experience sensory processing difficulties, affecting well-being, social relationships, educational performance and family life. Carers report unmet need for Occupational Therapy addressing sensory difficulties in autism. Manualised Ayres Sensory Integration® Therapy (SIT) is an Occupational Therapist-led, play-based intervention, providing sensory-motor engagement in meaningful activities which may provide benefit. The SenITA trial is the first Randomised Controlled effectiveness Trial of SIT for children with autism.

Objectives: To evaluate effectiveness of SIT in addition to usual care (UC), versus UC alone for autistic children with sensory processing difficulties, in terms of impact on problem behaviours, adaptive skills, socialisation, carer stress, and quality of life. Health economic and process evaluations were undertaken (process evaluation reported separately). Participants were recruited from a variety of settings in the UK.

Methods: Parallel group randomised trial incorporating an internal pilot, health economic and process evaluations. Children 4-11 years were recruited via health/social services and self-referral. Inclusion criteria: autism diagnosis; mainstream education; definite/probable sensory processing difficulties. Exclusions: current/previous SIT; current Applied Behaviour Analysis therapy. Intervention: Manualised SIT delivered over 26, one-hour sessions (individual face-to-face sessions twice a week for 10 weeks; twice per month for two months). In-person sessions were followed by two telephone sessions with carers (once per month for two months). Sessions were video recorded, and a sample rated according to the fidelity checklist. Adherence was defined as attending at least 13 of 20 sessions in the intensive phase of intervention delivery (the first 10 weeks). Comparator: UC for sensory processing difficulties only. Main analyses were modified intention-to-treat, with those providing outcome data included. Primary outcome: Irritability/agitation six months (Aberrant Behavior Checklist). Secondary outcomes: other problem/adaptive behaviours; functioning; socialisation; carer stress; quality of life; functional change (intervention arm only); sensory processing; intervention and service use costs.

Results: Of 26 eligible families, 22 (84.62%) elected to participate in the trial. Of the 22 participating families, 15 (68.18%) completed all 13 weekly treatment sessions. Parents rated the treatment as highly satisfactory (CSQ-8: M = 28.4, SD = 3.29, out of a maximum score of 32). Dropouts reported personal reasons for terminating treatment and did not report any adverse events or effects related to treatment. One family reported an increase in child depressive thoughts and moods during and immediately after treatment, and another family reported manageable tantrums and heightened anxiety during treatment. Anxiety symptom severity and FA were significantly reduced from pre- to posttreatment and this reduction was maintained at 2-month follow-up.

Conclusions: Intervention did not demonstrate benefit above UC: subgroup effects are hypothesis-generating only but could be further explored. SIT appears to be effective for individualised goals though it remains unclear whether effects observed are maintained in the longer-term.

405.275 (Poster) A Telehealth Adaptation of Children’s Friendship Training: Preliminary Results of Feasibility, Acceptability, and Efficacy in School-Age Children with Autism and Attention-Deficit/Hyperactivity Disorder
Background: Children’s Friendship Training (CFT) is a parent-assisted, evidence-based, manualized intervention aimed to improve social skills in school-age children with social communication challenges (Frankel & Myatt, 2003). The efficacy of CFT has been demonstrated for youth with autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), and other neurodevelopmental conditions (e.g., Frankel et al., 2010). However, studies to date are based on the in-person delivery of the 12-week outpatient program. Motivated by the challenges of the COVID-19 pandemic, multiple studies have documented the efficacy of parent-assisted autism interventions delivered via telehealth (Simack et al., 2022). Nonetheless, to our knowledge, there have been no studies examining CFT delivered via telehealth.

Objectives: We aimed to examine the feasibility, acceptability and efficacy of a pilot telehealth adapted CFT intervention in school-age children with ASD and ADHD.

Methods: A 12-week CFT treatment program was delivered via telehealth (Zoom). Child groups of 4-5 participants ran simultaneously to caregiver meetings. Participants were assigned to a group according to grade (2nd-3rd or 4th-5th grade), and had an established DSM-5 diagnosis of ASD or ADHD. Didactic content and video roleplays from PEERS® open-access archives in substitution of in-person roleplays were delivered via shared screen. To examine the efficacy of telehealth CFT, the Social Responsiveness Scale-Second Edition (SRS-2) and Friendship Quality Scale (FSQ) were completed pre- and post-treatment by caregivers and children, respectively. To assess feasibility and acceptability, a Caregiver Satisfaction Survey (CSS) was completed following treatment delivery, and attendance and homework completion were recorded each session. Here, we present data from the first four groups completed between April 2021 to January 2022. Given the preliminary nature of the analyses, Cohen’s $d$ effect sizes of within-subject mean score pre- and post-intervention differences are reported.

Results: Participants included 17 parent-child dyads, with 16 completers (n=10 ASD; n=6 ADHD; M age =9.85; 75% male). Rate of session attendance was 98% and 95% for children and parents, respectively. Homework completion rate was 84% for in-group calls, 80% for out-of-group calls, and 73% for get-togethers. Mean caregiver satisfaction total-score on the CSS (possible maximum total=50) was 42.4±4.7. FSQ self-ratings and SRS-2 caregiver-ratings were small regardless of primary diagnosis (Cohen’s $d$=.2-.3). However, there was a diagnostic-specific effect for self-reports: ASD children reported moderate levels of improvement in the quality of their friendships ($d$=.7) relative to negligible effects of those with ASD ($d$=.01). Similarly, a potential diagnostic-specific effect for SRS-2 caregiver-ratings was observed according to the SRS-2 social domain. For example, a small-to-moderate effect ($d$=.4) was observed in Social Awareness and Social Communication in the ASD group, whereas a robust effect ($d$=.9) was noted in Social Cognition within the ADHD group.

Conclusions: This study is the first to deliver CFT via telehealth. Initial results indicate high levels of session attendance, homework completion, and parent satisfaction, supporting the feasibility and acceptability of the telehealth-CFT intervention. Preliminary results of diagnostic differential effects suggest that larger studies are needed to investigate the potential differential utility and mechanisms of response to treatment in school-age children with ASD and ADHD.

405.276 (Poster) A Thematic Analysis of Autistic Adults’ Perceived Value of Dialectical Behavior Therapy Skills Training


Background: Previous studies have shown that 79% of autistic adults without Intellectual Disability meet the criteria for at least one psychiatric condition in their lifetime. The lack of evidence-based practices for autistic adults creates an urgent need for interventions that are informed by and tailored to autistic individuals and their unique needs. Dialectical Behavioral Therapy (DBT), a gold-standard treatment for individuals with borderline personality disorder, consists of weekly individual therapy, weekly group skills training, and weekly consultation team meetings for therapists. DBT Skills Training (DBT-ST) is a condensed version of standard DBT that consists of only weekly group skills training sessions, and there is evidence that DBT-ST can be a valuable transdiagnostic treatment to improve emotion regulation capacity. Prior research has found preliminary support for the use of DBT-ST with autistic adults who experience co-occurring mental health conditions. This study expands upon previous research by gathering and assessing autistic adults’ experiences with DBT-ST to amplify the voices of autistic stakeholders.

Objectives: This study qualitatively examines autistic adults’ experiences with a DBT-ST group.

Methods: Semi-structured interviews were conducted with 11 autistic adults (10 males, aged 19-65) who participated in a 6-month DBT-ST group-based intervention to assess their experiences with and the perceived value of the program. DBT-ST utilizes a group format to teach participants emotion regulation, distress tolerance, interpersonal skills, and mindfulness through a series of four modules. Participants are provided with homework and in-class practice opportunities designed to encourage the application of these skills in a variety of
contexts. All interviews were conducted via Zoom, recorded, and then transcribed verbatim. Thematic analysis is being conducted to analyze participant responses.

**Results:** Overall, participants reported a very positive experience with the DBT-ST intervention. Preliminary analysis revealed three content areas that were most valuable for participants: emotion regulation, distress tolerance, and interpersonal effectiveness. Table 1 provides descriptions and quotations that illustrate common participant experiences with the DBT-ST group.

Recommendations regarding the implementation of DBT-ST, including further modification tailored to the distinct needs of autistic individuals, will also be summarized.

**Conclusions:** The present study is among the first to learn directly from autistic adults about their experience with DBT-ST. Emotion regulation, distress tolerance, and interpersonal effectiveness are primary targets of DBT-ST, and our research shows that autistic adults find each of these areas to be meaningful and impactful. DBT-ST with modifications, such as increasing the use of visual aids and reducing the pace of content presentation, may be a promising treatment to improve emotion regulation, distress tolerance, and interpersonal effectiveness for autistic adults. Future research should include autistic adults in the modification, implementation, and analysis to establish DBT-ST as an effective intervention for autistic adults with a co-occurring psychiatric condition.

**405.277 (Poster) Acceptance, Perceived Ethical Risks, and Effectiveness of a Robot-Assisted Emotion Regulation Therapy Approach for Children on the Autism Spectrum**


**Background:** Increasing evidence shows that children on the autism spectrum (AS) might benefit from robot-assisted therapy (RAT) approaches for aberrant socio-emotional behavior. However, the few existing studies investigating feasibility, acceptance, and effectiveness are limited by methodological problems such as small ample size and lack of control conditions.

**Objectives:** Therefore, in the context of i) an online study and ii) a prospective laboratory study this study aimed at gaining insight into stakeholders’ acceptance of an elaborate RAT scenario as well as its effectiveness.

**Methods:** In the context of a multidisciplinary and multicenter study, a user-centered designed RAT interaction scenario targeting the regulation of negative emotions (frustration) in a competitive game scenario in children on the AS by using the humanoid robot Pepper (Softbank Robotics) was evaluated in controlled designs in terms of acceptance, usability, and ethical risks (online study; N=133), and early effectiveness (laboratory study; N=34) in different stakeholder groups (children and adults on the AS, caregivers, and autism clinical professionals).

**Results:** In the online study, AS stakeholders rated both a video-demonstrated RAT scenario and a comparable tablet-based therapy control condition as highly acceptable. However, stakeholders preferred the tablet-based therapy across measures of global acceptance, perceived usefulness, and ease of use. Negative evaluations regarding RAT mainly addressed the expected effort to implement the technology. Despite recognizing ethical and social risks, 83 % of the stakeholders found RAT to be ethically acceptable. Opinions were more divided on social robots being perceived as friends, possible attachment to robots and replacement of therapists by robots. In the ii) laboratory study six autistic and 11 non-autistic children (7-11 years) engaged in RAT and arousal levels were assessed, which resulted out of the competitive game by the children and their parents (N=17). Results showed a significant decrease in children’s arousal due to frustration and an increase in emotional valence after participating in a robot-assisted breathing exercise. In addition, the parents’ and children’s global acceptance of the presented RAT scenario was high, which was supported by positive ratings of acceptance-related factors (e.g., enjoyment, perceived usefulness).

**Conclusions:** The findings support the acceptance and proposed clinical value of RAT approaches targeting emotion regulation in children on the AS. They furthermore show the importance of enhancing perceived usefulness, ease of use, and reducing deployment effort as well as the relevance of engaging different groups of stakeholders (e.g., autistic children and adults, parents, and therapists) in RAT development in an active and participatory manner.

**405.278 (Poster) Adaptation and Implementation of a Positive Behavioral Intervention Support (PBIS) Program in a Residential Setting for Autistic Adults**

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Background:

Autistic adults have complex needs. In addition to the support needed with the core characteristics of an ASD diagnosis, they are significantly disadvantaged regarding employment, social relationships, physical and mental health, and quality of life (Howlin & Moss, 2012). Indeed, although adaptive functioning and autonomous skills may improve over time (Howlin, 2021), many adults face poor outcomes (Steinhausen et al., 2016). As a result, providing long-term supportive environments, including housing, is an important part of services for autistic adults (MSSS, 2013). Extant housing resources are not always adapted for this population. Local advocates point to limited capacity in residential resources, lack of staff training, inadequate familiarity with clientele and their needs, and mismanagement of crises leading to hospitalizations (Fédération québécoise de l’autisme, 2019). To address these issues, we adapted a positive behavior intervention support (PBIS) program to implement a new innovative Canadian residential resource. This resource was designed for autistic adults, considers their sensory needs, and focuses on their quality of life. PBIS is an evidence-based program that has been implemented primarily in school settings. Recently, PBIS programs have also been launched in clinical settings for adults with intellectual disabilities or on the autism spectrum, including in residential settings (Lubar, 2018; MacDonald et al., 2018). Still, knowledge is limited on social acceptability of PBIS programs and its effects on staff attitudes, and well-being at work in a residential setting for autistic adults.

Objectives:

The objectives are to assess: 1) the social acceptability of the PBIS program according to staff and parents, 2) the effects on staff attribution regarding challenging behaviors, burnout, and perceived stress, and 3) the program implementation (facilitators and barriers).

Methods:

A total of 26 participants were recruited. Employees were educators (n=16), managers (n=1), clinical experts (n=1), and direct care workers and other positions (n=7). Participants completed questionnaires at two points: After the first PBIS training by the research team and at the 1-year post program implementation. A mixed-methods, pre-post design was used to meet the research objectives. We used the Treatment Acceptability Rating Form (TARF-Revised; Reimers & Wacker, 1988) to assess social acceptability. French versions of Challenging Behaviors Attributions Questionnaire (CHABA; Hastings, 1997), Maslach Burnout Inventory (Maslach & Jackson, 1986), and Perceived Stress Scale (PSS-10; Cohen, et al., 1983), were used to assess attributions, burnout, and perceived stress. We analyzed the data using non-parametric tests (Wilcoxon). Analysis of semi-structured interviews with stakeholders and parents will use a thematic analysis approach (Braun & Clarke, 2006).

Results:

After one year of implementation, the level of social acceptability remains high among respondents (x= -0.276, p>0.05). The attributions, level of burnout, and perceived stress are stable between our two-measurement time-points (x=-0.852, -1.34, -0.204, p>0.05). Qualitative analysis of the interview with both stakeholders and parents will be performed by INSAR 2023 to complement these quantitative results.

Conclusions:

Results will guide the implementation of PBIS programs in other residences for adults with autism and thus contribute to improve services for this population. This project will then inform best practices in residential settings.

405.279 (Poster) Adaptation and Preliminary Evaluation of the Hong Kong Version of the Westmead Feelings Program (WFP): Emotion-Based Learning for Chinese Children with Autism Spectrum Disorder in Mainstream Schools Via Telehealth Delivery

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Background:

Westmead Feelings Program (WFP) is emotion-based learning for children with Autism Spectrum Disorder (ASD). Its impact to improve emotional competence in children with ASD in Australia has been established. The WFP2 learning materials was translated into Chinese, and adjustments were made in the content and process of intervention sensitive to linguistic, cultural and modality differences. The Hong Kong version was tried out in two groups of children with ASD, their teachers and parents for evaluation.

Objectives:

The present study aimed to identify the adaptations needed in a context culturally different from Australian societies and to evaluate the intervention outcomes on Chinese children with ASD in Hong Kong.
Methods:

The original English version of the WFP2, for children without mild intellectual disability, was translated into traditional Chinese by two trained WFP2 facilitators. To align with the school-based delivery mode, the original children sessions and the parent/teacher workshops were condensed to 12 sessions and 3 sessions respectively.

Other than adaptations made according to local cultural context and Chinese language features, telehealth adaptations were also included to replicate the structure and format of the WFP2.

Participants were 11 primary school-aged children with ASD, as well as their teachers and parents from two mainstream schools. WFP2 sessions were delivered by two trainers under close supervision of trained WFP2 facilitators. The fidelity check of the WFP2 implementation was done by educational-psychologists-in-training under supervision.

The emotion competence skills were rated by parents and teachers separately on Emotions Development Questionnaire (EDQ) prior to and after the WFP2 implementation. Children evaluated how often they applied emotion competence skills at home and at school after each module.

Results:

All WFP2 sessions were conducted with high fidelity and good attendance. Both trainers passed the WFP2 Fidelity Checklist. All children except one attended all sessions. The average attendance rates of parents and teachers were both 77%.

The questionnaire return rates were 100%. Parent and teacher reported mean scores (on EDQ) were reported in Table 1. Results indicated a significant increase in parent reports of children emotion regulation skills and parent emotion coaching skills. No significant changes were found in teacher reports.

The numbers/percentages of children applied emotion competence skills were reported in Table 2. The percentages of children reported the application of emotional competence skills were different among Modules (ranging from 82% to 45%) and across home and school settings (tried to have helpful thoughts and took other perspectives).

Conclusions:

After adjusting for cultural, linguistic and modality differences, the WFP2 appears to bring positive changes in children and parents. Yet, we are not certain this positive impact is the result of the intervention as no control groups were included. The current findings shed light on further improvement of both the adaptation and research methodology. The lowest application rates of skills taught in Module 1 indicates the 15 session WFP2 to be maintained. Future research on the effectiveness of the Hong Kong version should consider a treatment versus control trial.

405.280 (Poster) Adaptation of the Parents Taking Action Intervention to Support Caregivers of Young Children with Autism in Paraguay: Community Members’ Perspectives

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Background: Caregivers of autistic children in low-to-middle income countries experience many challenges to access resources to support their child’s development. Caregiver training may be a cost-effective way to support caregivers in such settings. Researchers agree on the importance of considering cultural factors (e.g., values, traditions, language) when selecting, adapting, or developing interventions for a specific group. Caregivers in Paraguay reported a need for training to support their young autistic children (Terol et al., 2022). Further culturally adapting the Parents Taking Action Intervention (PTA; Magaña et al., 2017), which was originally developed with a culturally responsive framework for Latino caregivers living in the US, may be a feasible and acceptable way to support caregivers of autistic children in Paraguay.

Objectives: (a) Understand the needs of caregivers of young autistic children in Paraguay, a low resource country, and (b) explore the perceptions of community members in Paraguay related to culturally adapting the PTA intervention to Paraguayan context.

Methods: Participants included: (a) caregivers of autistic individuals; (b) professionals who work with young autistic children (i.e., children 0-8 years old); and (c) self-identified autistic individuals. Participants completed a demographic questionnaire and participated in a 2-hour long focus group with other participants who shared their role. A total of six focus groups with 5-6 participants were completed. Each focus group comprised three main sections: (a) perceived needs of caregivers of young autistic children; (b) acceptability and suitability of the
content of the PTA for the Paraguayan context; and (c) practical and logistic considerations for implementing the PTA in Paraguay. Focus groups were conducted via Zoom in Spanish and were transcribed and translated to English for data analysis. Transcriptions were coded using thematic coding and deductive coding based on the Ecological Validity Framework and the Framework for Reporting Adaptations and Modifications to Evidenced-based Implementation Strategies (FRAME-IS).

Results: Results indicate that caregivers of young autistic children in Paraguay need access to information and strategies to support their children’s development. Additionally, participants’ recommendations related to the content including adding information about the inclusive education law in Paraguay, and stories of autistic individuals in Paraguay. Regarding the context, recommendations included a hybrid format and including a team of parents and professionals to deliver the intervention. Results from this study will be used to further document the needs and challenges of caregivers of young autistic children in Paraguay, and to culturally adapt the PTA intervention to the Paraguayan context. Successes and challenges recruiting participants and conducting the focus groups internationally, including collaboration with local community-based organizations and sharing researchers’ positionality as Paraguayan and former service providers for autistic children and their families in the country will also be shared.

Conclusions: Caregivers in Paraguay expressed their need for more support and cultural adaptations are required to make the intervention fit the Paraguayan context. Understanding and utilizing community members’ suggestions to culturally adapt interventions may be an optimal way to meet the needs of the intended recipients in a way that embraces and respects their cultural values.

405.281 (Poster) Adapting Safety Planning Intervention with and for Autistic Adults
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Background:
Autistic adults are an at-risk group for suicide and up to 65% of autistic people experience self-harm; a significant risk marker for later suicide attempts. Despite this, there is little research exploring suicide prevention interventions developed with, and for, this population. Through co-production, we address this research gap. Safety plans are a simple, potentially cost-effective and life-saving interventions, with demonstrated effectiveness in a range of clinical groups. They consist of a prioritized list of hierarchical steps that can be used prior to or during a crisis to mitigate risk of self-harm and suicidal behaviour. An Autism Adapted Safety Plan, designed with, and for, autistic adults, could be valuable for autistic people in times of crisis.

Objectives:
We aimed to refine and test the acceptability and feasibility of an Autism Adapted Safety Plan. We also aimed to explore data collection tools/methods to inform a subsequent randomised controlled trial.

Methods:
A series of six focus groups and four one-to-one conversations were held. Our involvement work captured the voices of 32 autistic adults, family members and service providers, who recommended adaptations to refine our draft autism adapted safety plan. We then conducted an interventional single arm feasibility trial with 10 autistic adults and 10 service providers to explore data collection tools/methods and gather information to inform a subsequent external pilot randomised control trial.

Results:
There was broad consistency between each participant group. Participants spoke to the content and layout of the autism adapted safety plans (e.g., the use of prompts, more detailed breakdowns around communicating distress, the inclusion of a scale) as well as delivery, resources, and scaffolding (e.g., the inclusion of feelings wheels). Autistic adults emphasised the importance of developing trust and understanding between autistic adults and service providers when developing the autism adapted safety plan. In terms of data tools/methods, autistic participants valued flexibility from researchers (e.g., receiving research documents in advance, having time to process, and adjusting meetings/data collection tools to suit the participant’s needs).

Conclusions:
Community members suggested a range of adaptations and additional supports that could accompany Autism Adapted Safety Plans to make them useful and useable for autistic adults. They also provided feedback on how research processes can be improved. Implications of our results for safety planning with autistic adults, to reduce self-harm, suicidal thoughts and behaviours in this group are discussed.

**405.282 (Poster) An Evaluation of Changes in Emotion Regulation over the Course of a Pilot Telehealth Trauma-Focused CBT for Autistic Youth**


**Background:** Autistic youth who have experienced trauma may also benefit from support for emotion regulation (ER), yet little is known about (a) whether ER changes over the course of trauma-focused therapy, and (b) whether baseline levels of ER relate to response to therapy. Trauma-Focused Cognitive Behavioral Therapy (TF-CBT; Cohen et al., 2016) is a widely used evidence-based program for supporting youth who have experienced trauma involving three phases (stabilization/skills, trauma narration/processing, and integration/consolidation).

**Objectives:** Prior work from this pilot study has shown significant reductions in self- and parent-reported trauma symptoms following TF-CBT. To further understand whether ER also changes over the course of TF-CBT, (1) we examine the change in ER scores from baseline to post-treatment. Then (2) we examine how weekly ratings of ER vary across the three treatment phases, with a particular interest in patterns of ER change during the trauma narrative phase. While this phase is designed to support youth in meaningful communication about their life experiences, caregivers are often fearful that activities involved in this phase (such as sharing stories about their trauma) may worsen symptoms or cause increases in emotional reactivity or dysphoria. Finally, (3) we investigate whether baseline ER correlates with the treatment response observed for core trauma symptoms.

**Methods:** Autistic youth (n=6, M_age=14.36, M_est. verbal IQ=86.5, M_SCQ=22.17) with clinical levels of trauma-related symptoms on the Child and Adolescent Trauma Screen (CATS) (M_CATS=37.67, clinically relevant level ≥ 21) participated in a pilot feasibility study evaluating 12-session telehealth TF-CBT. All participants had a history of trauma, confirmed by parent and self-report. Parent-reported measures are completed at baseline and post-treatment, including the CATS and the Emotion Dysregulation Inventory (EDI; reactivity and dysphoria subscales). The EDI was also collected at each session.

**Results:** (1) Pre-post change in ER (from baseline to post-treatment) was examined using one-tailed paired-sample t-tests. Scores on both EDI subscales, reactivity and dysphoria, decreased from baseline to post-treatment in a meaningful way, with large effect sizes (reactivity: t=-3.15, p=.013, g=1.37, dysphoria: t=-2.19, p=.04, g=-1.180). (2) Figures 1 & 2 demonstrate the mean EDI scores for the sessions before, during and after the trauma narrative phase of treatment per client. Mean EDI scores on both the reactivity and the dysphoria subscales showed no evidence of increase during the trauma narration phase. (3) Finally, baseline reactivity (r=.33, p=.522) and dysphoria (r=.23, p=.66) scores did not correlate with the amount of pre-post change in parent-reported trauma symptoms.

**Conclusions:** Participation in telehealth TF-CBT for autistic youth not only impacts trauma-related symptoms but can also support ER, as demonstrated by decreased levels of emotion dysregulation on the EDI. Examination of changes in ER over the course of the three TF-CBT phases did not show any evidence that reactivity or dysphoria increase during the trauma narrative phase. Since baseline ER scores were not associated with the amount of pre-post change in trauma symptoms, this suggests that pre-existing ER scores were not associated with better or worse treatment response. Future research should further evaluate TF-CBT and emotion regulation for autistic youth.

**405.283 (Poster) Anxiety Related Absence: Development of Recommendations for People Working in and with Schools in Scotland**

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**Background:**

A disproportionate number of autistic learners are affected by anxiety related school absence, with associated impacts on individual and family wellbeing. This has been exacerbated by the pandemic. Traditional approaches have often been ineffective. Within the neurodiversity paradigm, support occurs best through adaptations to naturally occurring environments, rather than through clinical or separate contexts, and the responsibility for change lies primarily with people around the learner, not with the learner themselves.

**Objectives:**

The National Autism Implementation Team (NAIT) developed an anxiety related absence resource for practitioners supporting autistic learners, and families, in Scotland. This research collaborated with key stakeholders to identify the features that should be included in an evidence-informed set of recommendations. The guide highlights the mindset with which to approach autistic learners, the importance of
considering the 24 hour life of the learner, and key supports. Materials aim to support those working in and with schools to be aware of issues for autistic learners, to take a staged intervention approach, and to develop an inclusive mindset.

Methods:

A review of published literature, and national and local guidance was completed. A collaborative project was conducted, and consultation completed with key stakeholders, including: autistic people, parents, and professionals from health, education and third sector. Working with stakeholders allowed identification of the key elements which should be incorporated. Peer validation strategies were employed to ensure the content remained relevant to lived experiences, including consultation with autistic teenagers and families, teachers, third sector partners, and parent support professionals which enabled co-creation of content. Professional learning (n=550 professionals) with staff from education, health, social care and third sector from 30 local authorities across Scotland included attendees from Early Years, Primary and Secondary provision and a small number of people working with adults.

Results:

In this presentation we highlight lessons learned from development and implementation, identifying critical issues and challenges. We focus on the development of practitioner competence, and how materials have been organised to provide an overview of this complex area. The resource includes practical steps for emotional regulation, social communication and transactional supports. Messages were tailored to meet the needs of those working in and with schools and have been agreed through consultation with the autism community:

- Reduce language
- Provide an individual safe space
- Developmentally appropriate individual timetable
- Planned movement breaks
- Practice and prepare for change
- Two key adults
- Planned home school communication
- Ensure staff have access to help and support
- Listen to parents

Value was placed on ensuring the documentation was underpinned by neurodiversity affirmative principles. The importance of delivering supports in school locations, by the team around the child was highlighted, and stakeholders recognised that the work should be responsive to individuals and be reflective of changes in need.

Conclusions:

The guidance has been funded by the Scottish government and adopted by local authorities across Scotland. Facilitating effective inter-professional, interagency and stakeholder collaboration allowed for effective implementation. This collaboration resulted in high levels of stakeholder involvement and ownership of the materials.

405.284 (Poster) Application of PEERS, a Skills Training Program for Making Friends in Japanese Schools
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Background: In life, having close friends is positively associated with self-esteem and independence. Adolescents with autism often have trouble making friends, and the PEERS for Adolescents was developed at UCLA to address this issue. Our earlier study demonstrated that with linguistic and cultural modifications, PEERS is effective in improving social functioning for adolescents with ASD in Japan. However, many parents in Japan usually work and too busy to attend 90-minute sessions with their children. Therefore, we implemented PEERS School-based in a form adapted to Japanese schools and without parental participation, to test its effectiveness.

Objectives: This study examines the effectiveness of the school version of the Program for the Education and Enrichment of Relational Skills (PEERS School-Based), which focuses on improving social functioning through making friends and maintaining good relationships, in adolescents with autistic traits in Japan.

Methods: 29 primary and junior high school adolescents aged 11-14 (M =11.05; SD =15.21) participated in PEERS sessions and pre- and post- psychological tests, interviews and questionnaires. All participants (20 males and 9 females) were born and raised in Japan, were fluent in Japanese and confirmed their willingness and ability to participate in treatment. Thirteen of them participated in the PEERS program first, while the remaining 16 participated only in the survey during that term and joined the program in the following year. Pre- and post-intervention measures of children's behavior problems, social skills and communication in the first year were compared.
Results: Children who had taken part in the program first were more engaged with their peers, had greater knowledge of social skills and showed improvements in the communication domain than those who had not yet taken part in the program. Self-understanding interviews showed more positive or detailed accounts of the self after the intervention.

Conclusions: These results suggest that the PEERS school version is beneficial for Japanese adolescents with ASD in multiple social, communication and self-understanding domains. In addition, it has traditionally been difficult to implement scientific evidence-based programs in Japanese schools, and the fact that this initiative has enabled school teachers to participate in the program in several cities provides suggestions for the creation of future program delivery systems.

**405.285 (Poster) Arts-Based Programs for Neurodiverse Individuals: An Umbrella Review**

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Background: Existing literature suggests a menagerie of creative programs developed to support neurodiverse individuals, including those utilising art in their programs. The emergence of the neurodiversity paradigm and endorsement of strengths rather than disability has led to a growth in the body of evidence noting the benefits of art-based programs for neurodiverse individuals. Notably, these programs utilise varied mediums (such as music, dance, visual arts, drama, etc.) to support the different needs of neurodiverse individuals (behavioural, emotional, social, etc.). This variation restricts the evidence available for the full breadth of health impacts produced from all art programs as a collective, resulting in limited knowledge about how factors such as the type of medium and its dose can influence the reported results.

Objectives: To address this limitation, the current umbrella review aimed to identify and synthesise the current evidence relating to arts-based programs for neurodiverse individuals.

Methods: CINAHL, Cochrane Database of Systematic Reviews, EMBASE, Medline, ProQuest, PsychINFO, PubMed, Scopus, and Web of science were searched at a title and abstract level for studies published in English from 2011 to 2021. A complimentary grey literature search, along with a hand search of relevant Art Journals, the articles’ reference lists and citing articles, was also conducted. Eligible records were systematic reviews and/or meta-analyses that utilised an art-based support program for improving outcomes for neurodiverse individuals (as diagnosed by DSM-5). Independent reviewers then delivered quality appraisal and data extraction according to the Joanna Briggs Institute’s (JBI) Umbrella review methodology.

Results: Upon removing duplicates and screening records at a title, abstract and full-text level, 21 remaining articles were critically appraised. Seven studies were excluded for not meeting the minimum acceptable threshold (scored < 4), with the remaining studies (n=14) showing a low to moderate quality. Included reviews were limited to music (75%) and dance (intervention) and mainly targeted autistic individuals (76%). The systematic reviews mainly encompassed studies with a lower level of evidence and largely utilised observation for assessing how their targeted program affected the participants’ outcomes. Large heterogeneity amongst the programs utilised within the reviews, along with no reports on their manulisation, limits the knowledge around the fidelity of the programs and their active ingredients.

Conclusions: Although the existing body of knowledge has demonstrated the acceptability of specific art-based programs, the efficacy of such programs in supporting outcomes for neurodiverse individuals remains mainly unknown. Future studies using a more rigorous approach in evaluating manualised art-based programs can support a further understanding of the benefits of such programs.

**405.286 (Poster) Association between Autistic Traits and Academic Performance in University EFL Courses**

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Background:

Language courses in universities typically include more communicative activities than other lecture-type courses. It is considered possible that students who exhibit Broader Autism Phenotype (BAP) traits may experience disadvantages in classroom, failing to show good performance and participation in front of teachers. Although there are some reports on how autistic students are accommodated in language classroom (Bradley, 2019; Putera et al., 2016; Padmadewi & Artini, 2017), no study has yet demonstrated whether BAP students as well face the necessity of special support. Also, as Ito et al. (2014) reported that the GPA of the first-year foreign language subjects reliably predicts the possibility of subsequent dropouts, it would be meaningful to investigate whether the BAP traits could be a latent risk factor.

Objectives:

This study aimed at examining whether autistic traits in college students affect their academic success in the courses of English as a Foreign Language (EFL).
Methods:

A total of 861 university students (495 males and 366 females) completed Broader Autism Phenotype Questionnaire- Japanese version (BAPQ-J). Their academic performance was assessed by the course completion of four required English subjects taught in their first academic year (passed or failed). Teachers used active-learning methods based on the common syllabi, and the assessment was made based on participation (30%), quizzes and assignments (40%) and the final exam (30%). Students failed the course if the total came to less than 60% or the attendance rate did not reach 80%. Their general English proficiency level in listening and reading was assessed in the first quarter by using the Global Test of English Communication (GTEC).

Results:

Students who scored above the cut-off point in two or more BAPQ-J subscales (Sasson, et al., 2013; Trevisan & Birmingham, 2015), named as high-trait group, comprised 17.1% of participants (N=147). A t-test revealed that their GTEC scores did not differ between high-trait (Mean=212.72, SD=29.72) and low-trait groups (Mean=216.95, SD=31.11). As for their course completion, there were 9.4% of students (N=81) who failed one or more of the English subjects, and they showed significantly higher BAPQ-J scores than those who successfully completed all the four subjects [t(859)=2.84, p=.005] (Table 1). A logistic regression analysis was performed for the BAPQ-J scores as a potential predictor of course completion (Table 2), revealing that the scores reliably discriminated successful and non-successful students with an accuracy of 90.6%.

Conclusions:

Our findings demonstrate that students who strongly exhibit the BAP features are more likely to fail EFL courses, even though their general English proficiency does not differ from that of non-BAP students. It is possible that those students, regardless of their English ability, could not show the best performance in communicative activities and exams due to their characteristics. It is well-known that autistic individuals often have comorbid social anxiety disorder (Simonoff, 2008), which is well associated with failure in EFL subjects (Miura, 2019). This indicates that special attention should be paid to students who show anxiety or stress in classroom, since they might have high autistic traits and need better understanding and support.

405.287 (Poster) Autism Group Therapy for Awareness, Acceptance and Modulation of Emotions (A-GAME): First Findings from a Randomized, Waitlist-Controlled e-Health Trial

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Background:

Autistic adults frequently have comorbid psychiatric disorders such as anxiety and depression (Lai et al., 2019; Roy et al., 2015). This can be partially attributed to difficulties in emotion regulation (ER) and alexithymia (Bloch et al., 2021; Mazefsky et al., 2014). However, therapeutic treatment options focusing on ER are limited (Warwick et al., 2017) and rarely targeted at adults (Linden et al., 2022). To address this treatment gap, we developed the online-based Autism Group Therapy for Awareness, Acceptance and Modulation of Emotions (A-GAME).

Objectives:

The purpose of this study is to evaluate feasibility and acceptance of A-GAME and to collect preliminary, exploratory data on efficacy. Here we will introduce the intervention concept and discuss first findings.

Methods:

In the first treatment cycle, 18 adults (age range 21-56 years) with a confirmed diagnosis of autism spectrum condition were randomly assigned to the intervention group (n=8) or the waitlist-control group (n=10). A-GAME consists of 8 weekly online sessions within a fixed group. It is based on acceptance and commitment therapy and is designed to address specific needs and difficulties of autistic people, also implementing concrete input by autistic experts by lived experience. Sessions consist of informational pieces on emotions, reflection on personal experiences and attitudes, and practical exercises. Prior to and directly after treatment all participants completed self-report instruments on symptoms of depression and anxiety, as well as on difficulties in awareness and regulation of emotions. They took part in pre- and post-treatment clinical evaluations of adaptive functioning and clinical global impression, carried out by psychologists blind to group assignment. They also answered an open questionnaire reflecting on their experience of and attitudes towards emotions, online therapy (if applicable), regulation strategies, and study context such as videoconference environments and the COVID-19 pandemic. In a first exploratory analysis, group comparisons were analyzed using independent t-tests of score differences.
Results:

There were no drop-outs during the first treatment cycle and there is a growing waitlist for future study participation, pointing to good feasibility and acceptability of A-GAME. First findings showed greater improvements of the intervention group in interpersonal ER (d=0.875, p=0.048) and in a subcomponent of alexithymia, concerning difficulties identifying feelings (d=0.95, p=0.036). There was also a somewhat larger improvement in global adaptive functioning (r=0.484, p=0.046). No differences were observed in change of ER skills focused on suppression and reappraisal, and in changes of global clinical impression. Qualitative findings indicate that the online setting may reduce typical stressors of therapy participation, such as commuting via public transport and health concerns, while internet connection problems can be an additional stressor.

Conclusions:

This study is a first step in developing an innovative form of therapeutic support for autistic adults. Preliminary findings suggest that A-GAME might have beneficial effects, improving emotion awareness, selected ER skills, and adaptive functioning. In light of the small sample size, these results need to be interpreted with caution and will be complemented by additional research.

**405.288 (Poster) Autistic Dating Experiences and Needs: Towards Co-Creation of a Dating-Related Social Skills Program**

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Background: There is ample evidence that group social skills interventions can be efficacious for teaching social skills and increasing friendships for autistic adolescents and adults (Jonsson et al., 2019; Vernon et al., 2018). Recently, more attention has been focused on understanding the challenges and experiences autistic people have in romantic relationships (Sala et al., 2020). However, only one study exists that examines a dating-related program designed for autistic adults with input from autistic community members (Rothman et al., 2022). Currently there continues to be a shortage of co-developed dating curriculums informed by the and as a result, the majority of existing programs may not address their unique strengths and challenges.

Objectives: The present study sought to understand the dating and romantic relationship experiences and challenges of autistic individuals, what participants desired from romantic relationships or their partners, as well as their interest in topics to be covered in a future group socialization intervention focused on dating and romantic relationships.

Methods: In this qualitative investigation data were collected from a sample comprised of 8 autistic adults who completed an interview. Participants were recruited using a variety of social media posts and listservs. Participants were gender-diverse, culturally-diverse, and of various sexual orientations. The interview queried participants about (a) challenges in dating/romantic relationships; (b) desirable qualities in a romantic partner or relationship; (c) Topics that would be helpful to include in a future social skills program designed to teach dating-related social skills; (d) experiences of dating another neurodiverse person versus a neurotypical person. A thematic content analysis (TCA; Braun & Clarke, 2006) was conducted to identify themes present within and across participant interviews.

Results: Preliminary results of the TCA revealed common themes of intellectual connection, independence, commonalities, complementary qualities, and understanding and acceptance as characteristics sought in a romantic relationship. When asked about challenges related to initiating and maintaining romantic relationships, safety, being stereotyped, finding people, concern about their appearance, masking, sensory differences, self-discovery, and communication emerged as central themes. Finally, common themes endorsed for topics to include in a future dating social skill program included: (a) sexual education; (b) relationship expectations (c) relationship progression; (d) recognizing red flags/safety; (e) adapting to neurotypical social expectations; (f) dating options/places; (g) where to find people; (g) interpreting implied intentions.

Conclusions: This study provides insight into the unique needs and considerations of autistic adults who are pursuing romantic relationships. Moreover, it provides a preliminary understanding of challenges that autistic individuals across the spectrum of ethnicity, sexual orientation and gender identity experience. Understanding autistic experiences and integrating their input into a future dating skills program ensures that the resulting curriculum aligns with their priorities, relationship expectations, and remains respectful of their autistic identity as well as other identities they may hold.

**405.289 (Poster) Behavior Therapy for Children and Adolescents with Autism Spectrum Disorder in Routine Clinical Care: A Systematic Review and Meta-Analysis**

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Background:
Various behavioral programs have empirical support for autism spectrum disorder (ASD) in children. Most of the evidence is derived from efficacy studies conducted in university settings, and there is less knowledge regarding how these programs perform in routine clinical care.

Objectives:

To assess the effectiveness of behavior therapy (BT)/behavioral interventions for ASD in children in routine clinical care settings.

Methods:

A systematic review and meta-analysis of behavior therapy (BT)/behavioral intervention for ASD in children in routine clinical care was conducted. Ovid MEDLINE, Embase OVID, PsycINFO, ERIC, and Web of Science were searched for articles published until April 2021. The effectiveness of BT, methodological quality, and moderators of treatment outcome were examined, and the effectiveness of the interventions were benchmarked with efficacy studies for the same disorder.

Results:

Thirty-one studies were included, comprising 1448 participants with a mean age of 42.2 months (SD17.7). Medium to large within-group effect sizes (ES; g = 0.78-1.28) were found at post-treatment for the outcome domains adaptive behavior, cognition, communication, and socialization, with a large average ES at follow-up (g = 1.21). The mean attrition rate was 8.8%. Although all ages up to 18 years of age were included in the search, only two studies included children above 60 months.

Conclusions:

Comparison of effectiveness and efficacy studies showed that evidence-based BT in routine clinical care yielded as good effects as in university settings. The findings support evidence-based behavioral treatments delivered in routine clinical care as efficacious in reducing symptoms of ASD. As treatment effects are not lost when evidence-based treatment programs are transported from research clinics to routine clinical care, further implementation of evidence-based interventions is needed in routine clinical care for children with autism disorders. There is however a dearth of behavioral intervention studies including older children with ASD.

405.290 (Poster) Benefits of an Online Small Group Cognitive Behaviour Therapy Program for Autistic Children during the Pandemic: Evidence from a Community-Based Implementation Study

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Background: Emotion dysregulation and mental health problems are concerns that impact the wellbeing of autistic children. Support often involves the use of adapted cognitive behaviour therapy (CBT). Randomized controlled trials have demonstrated the efficacy of the Secret Agent Society Small Group (SAS:SG), an adapted CBT-based program, in targeting the development of social and emotional skills in autistic children. However, research is still needed in its effectiveness with improving child outcomes when delivered by publicly funded, community-based autism providers under real-world, ecologically valid conditions, especially within the context of the pandemic.

Objectives: This project aimed to evaluate the clinical utility of a group-based virtual SAS:SG program in improving emotion regulation and social skills, and concerns related to mental health challenges, in autistic children. The project also assessed child factors associated with change in outcomes after participating in the program.

Methods: The 10-week SAS:SG program was delivered by seven community-based autism service providers across Southern Ontario, Canada. SAS therapists led children through a series of computer-based games, role-playing tasks, and home and school missions. Caregivers attended separate group sessions with therapists. Caregivers completed pre-, post-, and 3-month post-intervention surveys that captured family demographics and child’s social and emotion regulation skills (Emotion Regulation and Social Skills Questionnaire [ERSSQ]; Beaumont & Sofronoff, 2008), symptoms related to an array of mental health problems (Child and Adolescent Symptoms...
Conclusions: This study demonstrates the feasibility and effectiveness of community-based virtual socioemotional skill-building programs; according to caregivers, participation benefited children by improving their social and emotion regulation skills, emotion reactivity, as well as symptoms related to anxiety and depression. Limitations include the lack of a control group and the inclusion of only parent-reported measures of child outcomes. In general, the study adds to the growing literature on the utility of evidence-based interventions in real-world, ecologically valid, and community-based settings. Next steps include examining qualitative data from caregiver and child experiences, expanding the implementation of the program to publicly funded youth mental health services and increasing the geographic reach of the program to autism families across Ontario.

405.291 (Poster) Can Virtual Social Skills Intervention Affect Intolerance of Uncertainty in Autistic Adolescents? E. J. Adler, S. A. Lehman; D. M. Glad, S. K. Pardej; H. K. Schiltz; M. Simons; Z. Bella, and A. V. Van Hecke, (1)Psychology, Marquette University, Milwaukee, WI, (2)University of Wisconsin-Milwaukee, Milwaukee, WI, (3)UCLA, Los Angeles, CA, (4)Educational Psychology, University of Wisconsin-Milwaukee, Milwaukee, WI

Background: Intolerance of Uncertainty (IU), which includes negative beliefs about uncertainty and negative emotions, behaviors, or thoughts as reactions to uncertainty (Buhr & Dugas, 2009), has been reported to be a causal factor mediating the relationship between autism and anxiety (Boulter et al., 2014). Specifically, IU has been shown to mediate social responsiveness and anxiety, accounting for over 75% of the variance in both autism and Williams syndrome samples (South et al., 2021), suggesting that IU is a key mechanism of anxiety beyond these social profiles. Furthermore, IU has significant clinical implications; levels of IU in autistic people mediated reported change in clinical anxiety following cognitive behavioral therapy, such that higher IU predicted less change in anxiety after intervention (Keefe et al., 2016). Given that the in-person delivered PEERS intervention (Laugeson & Frankel, 2010) has been found to decrease anxiety in autistic adolescents (Schohl et al., 2014; Hill et al., 2017; Factor et al., 2022), it will be important to explore whether telehealth delivered PEERS also affects adolescents’ levels of IU.

Objectives: The present study explored the effects of the PEERS for Adolescents Telehealth intervention on adolescent level of IU, a key mechanism of anxiety in autism.

Methods: Thirty-one families with adolescents aged 11-17 years (M = 14, SD = 1.54; 84% male) were enrolled in the current study based on 1) documentation of an autism diagnosis, 2) IQ ≥ 70, and 3) access to reliable Wi-Fi on two devices. Participants completed PEERS for Adolescents Telehealth in 16 weeks via video conferencing platforms. Adolescents and caregivers completed parallel versions of the Intolerance of Uncertainty Scale – Child (IUSC: Comer et al., 2009) pre- and post-intervention. The IUSC yields a Total score and two subscales: Factor 1 (idea that uncertainty has negative behavioral and self-reference implications) and Factor 2 (belief that uncertainty is unfair and spoils everything). Using SPSS 28.0, paired samples t-tests examined change pre- to post-intervention. Both null-hypothesis significance testing and effect sizes were used to interpret results.

Results: Analyses revealed significant decreases in caregiver-reported adolescent level of IU via the IUSC Total score (t(30) = 2.56, p < .05) with a medium effect size (d = .46), and via the Factor 2 score (t(30) = 3.41, p = .01) with a large effect size (d = .61). No significant changes were found for caregiver-reported IUSC Factor 1 or any of the adolescent-reported IUSC scores. Means and standard deviations reported in Table 1.

Conclusions: These findings indicate that PEERS for Adolescents Telehealth may yield positive benefits on caregiver-perceived adolescent IU, especially the belief that uncertainty is unfair; while self-reported IU did not. The differential findings for self- vs. caregiver-report could be due to the behavioral (observable) vs. cognitive (internal) aspects of IU. Considering that PEERS seeks to establish some form of certainty in novel social interactions by providing clear rules for nuanced social engagement, perhaps this reinforces a desire for certainty in adolescents. In contrast, caregivers may observe their adolescent behaviorally engaging more effectively in seemingly uncertainty social situations. Future research should examine concordance between improvements in anxiety, IU, and social skills self-efficacy due to PEERS.
405.292 (Poster) Can an Inclusive School-Based Music Program Enhance Social Inclusion and Self-Esteem of Adolescents on the Autism Spectrum?

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Background: Group music making possesses an intrinsic communication potential that holds promise for improving communication skills and social interactions. Group music-making is a cooperative structured activity that provides a unique opportunity for social inclusion and support where people with and without disability work as a team to reach a common goal (i.e., music-making). Music programs are also associated with gains in self-esteem of adolescents and young adults on the Autism Spectrum (AS). Furthermore, the self-esteem of people on the AS and within the general population positively influences perceived social support.

Objectives: This study aimed to investigate the impact of an inclusive (vs. non-inclusive) music program on indices of social inclusion, i.e., peer acceptance and social support, and on self-esteem.

Methods: Forty-nine adolescent autistic (n= 23) or non-autistic (n= 26) participants were included in this study implemented in a high school setting. Adolescents were divided into three conditions: an AS group (n = 7), a non-AS group (n = 16), and two inclusive groups (AS: n = 5 and non-AS: n = 5; AS: n = 9 and non-AS: n = 5). Students followed a 16-week music-making curriculum where they learned to play the djembe primarily as well as other percussion instruments. Before and after the music program, students in the inclusive and non-inclusive conditions completed the Social Support Appraisals Scale to measure potential changes in perceived social support, as well as the Rosenberg Self-Esteem Scale to measure changes in self-esteem. In addition, non-AS students in both conditions completed the General Social Subscale of the Shared Activities Questionnaire before and after the music program to measure potential changes in peer acceptance.

Results: A repeated measures mixed ANOVA revealed a significant interaction effect between self-esteem scores and condition, such that scores of students on the AS were statistically significantly higher at post-intervention compared to pre-intervention for the non-inclusive group (M = 2.71, SE = 0.60, \( p < .001 \)) as well as for the inclusive group (M = 5.00, SE = .42, \( p < .001 \)) with the change more pronounced in the inclusive group. There were no statistically significant changes in perceived social support nor in the peer acceptance of students on the AS in either condition (\( ps > .05 \)).

Conclusions: Our results suggests that inclusive music-making has a positive effect on self-esteem and does not have adverse effects on perceived social support and peer acceptance of students on the AS. This research supports the development of a novel line of inclusive interventions that may have beneficial effects for AS and beyond and set the stage for the implementation of music programs in family, educational, community, and mental health settings. This would ultimately improve social inclusion of neurodiversity to foster positive outcomes for many adolescents, with and without developmental disorders.

405.293 (Poster) Central Atrium for All

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Background:

Increasing research explores how diverse and intersecting identities, such as race, disability, and sexual orientation interact with space to influence an individual’s inclusion within a physical environment. The MIXMuseum Initiative aims to transform public spaces within a museum to increase accessibility by more people, including those with social disabilities and sensory sensitivities. Within this initiative is the Central Atrium for All project at Queens Museum (QM).

Objectives:

To explore feasible and scalable re-design of QM to promote greater accessibility and usability by a diverse range of visitors and staff through user driven feedback.

Methods:

An interdisciplinary mixed methodology study design grounded in public health and architecture research methods.

Qualitative Methods
In line with participatory design (PD) practices, an “Access Cohort” (n=25) of Queens residents was recruited as paid experts of their own lived experience. Investigators conducted 4 focus groups (FG) and 10 PD workshops over multiple rounds with this cohort. FG had facilitated tours of the QM building, followed by discussions around access barriers for key spaces and activities. PD workshops focused on inclusive design solutions through PD activities to address the access barriers. Additionally, QM staff (n=22) completed an open-ended, qualitative survey on observed challenges and desired improvements, while QM Ambassadors completed observation logs (n=5) to report their observations of visitors’ experiences. FG and workshop transcripts, staff surveys, and observation logs were coded and analyzed using NVivo qualitative software.

Quantitative Methods

Visitors (n=136) completed a survey on accessibility and inclusion as related to their visitor experiences. The survey aimed to quantify concerns of physical distancing, physical touch, physical accessibility, signage, visibility/navigation, and inclusion within 7 spaces of QM: Entry, Front Desk, Atriums, Seating, Bathrooms, Circulation, and Panorama using a 5-point Likert scale. All analyses were performed using SAS quantitative software.

Results:

Staff and Ambassadors reported challenges specifically affecting the following user groups: autistic, elderly and children, physically disabled, low vision/blind, trans, and culturally and linguistically diverse visitors. FG themes highlighted how users faced barriers in arriving at the museum, entering, orienting/wayfinding, self-care and caregiving, sitting and resting, circulating, and participating. PD workshops produced user driven design solutions that addressed challenges regarding Entry, Reception, Wellness, and the Atrium.

Concerns were highest in the following spaces: distancing in Seating (Mean = 1.56, SD = 1.01); touch in Bathrooms (M = 1.65 ± 0.98); accessibility in the Panorama (M = 1.44 ± 0.86); signage in Entry (M = 1.61 ± 1.01); visibility/navigation in Entry (M = 1.46 ± 0.91); and inclusion in Entry (M = 1.34 ± 0.95).

Conclusions:

These findings highlight vulnerable groups, including autistic individuals, currently limited in their ability to fully use public spaces and contribute to the understanding of how physical environments influence end users’ accessibility and inclusion within the built environment. This case study showcases a novel interweaving of methodologies from public health and architecture research, as well as the importance of grounding work within users’ lived experiences and solutions. Improving usability of the built environment for more people will allow for greater opportunities for socialization.

405.294 (Poster) Clinical and Behavioral Outcomes from a Pilot RCT of the Selfi Program: A Novel Social Media Skills Group Intervention for Autistic Adults

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Background: Social media is a popular medium of social communication in which modern relationships are cultivated. Many autistic adults report a preference for computer-mediated communication because it grants them a greater sense of control and comprehension compared to in-person social communication. Benefits associated with autistic social media use include greater levels of friendship quality and happiness, while challenges include increased anxiety, harassment, and cyber-victimization. Anxiety, social connectedness, and social media engagement are factors that have been noted to impact the relationship between social media usage and positive outcomes among autistic individuals. The Socialization, Education, and Learning, For the Internet (SELF2) program is a novel 9-week social media skills group intervention intended to help autistic individuals safely and effectively socialize online.

Objectives: The aim of the following study was to assess clinical and behavioral outcomes after participating in the SELF2 program.

Methods: The present study utilized a pilot RCT with 25 autistic adults (M = 24.6 years; SD = 5.88) to explore preliminary clinical and behavioral outcomes after participating in the 9-week SELF2 program compared to a waitlist control group. Clinical measures related to generalized anxiety, social anxiety, and social connectedness, while behavioral measures evaluated the frequency of Facebook behavior, Facebook improvement, and difficulty related to individualized social media goals.

Results: Compared to the waitlist condition, participants in the treatment condition demonstrated improved Facebook usage (p = .03) and trending improvements (p = .10) in the frequency of Facebook comments and posts. Treatment participants also reported a significant reduction (p < .01) in difficulty on individualized goals. There were non-significant differences between groups on all other measured outcome variables, which was expected considering the small sample size.
Conclusions: After participating in the SELF! program, participants demonstrated increased Facebook engagement, improved Facebook usage, and decreased challenges related to personalized social media goals. These findings represent signals of promise regarding the efficacy of the innovative SELF! program and an emerging area of autism research. Next steps include intervention refinement prior to embarking on a larger and more-robust clinical trial.

405.295 (Poster) Clinician Attitudes, Self-Efficacy, and Knowledge about Safety Planning with Autistic Youth before and after a Tailored Suicide Prevention Intervention Training

Background: There is growing awareness that autistic individuals are a particularly high-risk group for suicide. Alarmingly, autistic individuals are up to nine times more likely to experience suicidal ideation, up to five times more likely to attempt suicide, and over seven times more likely to die by suicide. The autistic community has identified suicide prevention and access to evidence-based practices as top priorities. The Safety Planning Intervention, a brief evidence-based suicide prevention intervention, has demonstrated effectiveness in non-autistic individuals. In a previous study, clinicians reported using Safety Planning with autistic and non-autistic clients at a similar rate but reported greater intervention acceptability for non-autistic clients. The present study will compare the Safety Planning Intervention tailored for Autistic individuals (SPI-A) with the SPI-A plus structured follow-up contacts (SPI-A+). Evaluating clinician attitudes, self-efficacy, and knowledge about safety planning with autistic individuals at-risk for suicide before and after the training on the tailored interventions allows us to assess the effectiveness of the training and better understand important clinician-level factors.

Objectives: We assessed whether there was a significant change in clinicians’ self-reported attitudes, self-efficacy, and knowledge about safety planning with autistic youth after the tailored safety planning training. Additionally, we assessed whether post-training attitudes, self-efficacy, and knowledge differed by intervention condition.

Methods: Clinicians completed a demographic questionnaire and pre-training surveys through REDCap. We assessed attitudes, self-efficacy, and knowledge about safety planning with autistic youth using validated measures adapted for the tailored intervention. Clinician participants were randomized to either SPI-A (n=47) or SPI-A+ (n=50) and then attended a condition-specific training. Following the training, clinicians repeated the surveys.

Results: A total of 97 clinicians (86 female, 11 male) from neurodevelopmental diagnostic clinics, primary care clinics, and medical specialty clinics in four United States healthcare systems completed both the pre- and post-training surveys. Preliminary analyses indicate significant pretest-posttest changes in clinician-rated attitudes, t(96) = 6.76, p < .001; self-efficacy, t(96) = 7.33, p < .001; and knowledge, t(96) = 7.71, p < .001. Additionally, post-training clinician ratings did not differ significantly by intervention condition for attitudes, t(95) = .89, p = .38; self-efficacy, t(95) = 1.42, p = .16; or knowledge, t(95) = 1.35, p = .18.

Conclusions: As hypothesized, attitudes, self-efficacy, and knowledge improved from pre- to post-training, suggesting positive overall effects of the training. Future analyses will look at item-specific changes in attitudes, as this will help to form a more nuanced understanding of the perceptions of the tailored plan. These subtleties are important to consider as we work to bridge the gap between research and implementation of suicide prevention practices with autistic youth. Of note, autistic individuals were involved in the development of the tailored intervention, and the clinician training was co-developed by and co-delivered with autistic partners. The role that stakeholders, including autistic individuals with lived experience of suicidality, their family members, and clinicians, have had in the process likely contributed to the success of this training on improving clinician attitudes, self-efficacy, and knowledge about safety planning with autistic youth.

405.296 (Poster) Clinician Perspectives of Acceptability, Appropriateness, and Feasibility of the Safety Planning Intervention Tailored for Autistic Individuals

Background: Despite elevated rates of suicidal thoughts and behaviors in autistic people, there is relatively little research about the effectiveness of suicide risk interventions and safety plans in this high-risk population. Our team identified a need to make the Safety Planning Intervention (SPI) more accessible and consistent for autistic individuals. With the collaboration and contributions of autistic researchers and advocates, we tailored the intervention for an autistic population and trained clinicians to implement it.

Objectives: The present study compares clinicians’ perceptions about the acceptability, appropriateness, and feasibility of the SPI tailored for autistic individuals (SPI-A) and the same intervention with structured follow-up contacts (SPI-A+). We assess whether intervention condition (SPI-A or SPI-A+) and clinician background information affect perceived acceptability, appropriateness, and feasibility before implementing the intervention.
Methods: Participants were 98 clinicians (87 female, 11 male) from four health systems that serve autistic adolescents and young adults. Participants were randomized to be trained in and implement the SPI-A (n = 48) or the SPI-A+ (n = 50). After the training session, participants completed the Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM), and Feasibility of Intervention (FIM) about their assigned intervention. The AIM, IAM, and FIM are widely used four-item measures with strong psychometric properties. Items are scored from 1 (completely disagree) to 5 (completely agree), with higher scores indicating greater acceptability, appropriateness, or feasibility.

Results: Overall, participants rated both interventions highly on the AIM ($M = 4.21, SD = .62$), IAM ($M = 4.28, SD = .64$), and FIM measures ($M = 4.15, SD = .59$). Bivariate correlated analyses indicated there was no significant correlation between AIM, IAM, and FIM scores and years practicing as a clinician ($M = 12.70, SD = 8.63$) or years of experience working with autistic individuals ($M = 11.61, SD = 7.96$; all $p’s > .08$). Furthermore, independent samples $t$-tests indicated there were no significant differences between SPI-A and SPI-A+ for AIM, IAM, and FIM scores (see Table 1). However, clinicians with prior formal training in suicide risk assessment or intervention reported higher FIM scores than clinicians who did not have prior training, $t(96) = -2.86, p = .005$.

Conclusions: Participants gave both SPI-A and SPI-A+ high scores on the AIM, IAM, and FIM. Interestingly, clinicians with prior training in suicide risk assessment or intervention were more likely to view the interventions as more feasible. No other factor significantly affected acceptability, appropriateness, or feasibility. Overall, these results are promising and suggest that clinicians can easily integrate both the SPI-A and SPI-A+ into standard clinical care for autistic youth.

405.297 (Poster) Coherence of Parental Representations Following Therapy for Autistic Children

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Background: Parental representations are the information processing rules that guide parents’ interpretations of their child’s feelings and behaviours (Benoit et al., 1997). These representations can be evaluated for their coherence, which is the clarity, consistency, multidimensionality, and authenticity of parents’ verbal narratives about their child (Main et al., 1985). For autistic people, relationships have been examined between coherence and parent characteristics, and within the context of parent-focused interventions. Research is needed to explore associations between coherence and child characteristics and potential changes in coherence following participation in child-focused interventions.

Objectives: Changes in coherence were investigated following participation in a 10-week cognitive behavioural therapy intervention designed to improve children’s mental health. Additionally, baseline associations were examined between parental coherence and child characteristics (i.e., autism symptoms, mental health), and associations between changes in coherence and child treatment outcomes (i.e., mental health).

Methods: 81 autistic children (89% boys; $M = 9.60$ years, $SD = 1.38$) and their parents (85% mothers; $M = 43.84$ years, $SD = 4.41$) completed the intervention. Coherence was evaluated using the Five Minute Speech Sample Procedure (Magaña et al., 1986). Subscale scores (focus, elaboration, separateness, concern, acceptance, complexity) and overall coherence scores were independently coded on a continuous scale from 1 to 7, with higher scores indicating more coherent representations. Interrater reliability was established by three coders coding 20% of the transcripts and was excellent for the subscale and overall coherence scores ($ICC = .92$ to $.98$). Autism symptoms were assessed at baseline with the Social Communication and Interaction and Restricted Interests and Repetitive Behaviour T-Scores on the Social Responsiveness Scale, Second Edition (Constantino & Gruber, 2012). Child mental health was assessed pre- and post-intervention with the Internalizing Problems, Externalizing Problems, and Behavioural Symptoms Index T-Scores on the Behaviour Assessment Scale for Children, Second/Third Edition (Reynolds & Kamphaus, 2004, 2015).

Results: 30% ($n = 24$) of parents were rated as coherent at pre-intervention, and this increased to 43% ($n = 35$) at post-intervention, though these changes did not meet a statistically significant cut point ($p = .07$). Post-intervention concern subscale scores were lower, $z = -3.38, p < .001$, and post-intervention acceptance scores were higher, $z = 2.48, p = .01$, than pre-intervention scores. Although baseline associations were not observed between coherence and autism symptoms (all $p’s > .10$), links emerged between coherence and internalizing problems, $r_1(79) = -.35, p = .001$, externalizing problems, $r_1(79) = -.34, p = .002$, and behavioural symptoms, $r_1(79) = -.31, p = .005$. Although changes in coherence across therapy were not linked with post-intervention internalizing or externalizing problems, changes in coherence accounted for 3% of unique variance in post-intervention behavioural symptoms, $t = -2.79, p = .007$, after accounting for baseline levels of clinical symptoms.

Conclusions: Understanding the relationships between parental coherence and child characteristics may provide insight into potential targets for intervention. Observed improvements in aspects of coherence following therapy and links with child treatment outcomes, advocates for parent-involved therapy, which will ultimately benefit the well-being of autistic children.

405.298 (Poster) Community-Informed, Autism-Adapted Group Cognitive Behavioral Therapy for Depression in Adolescents: Preliminary Feasibility, Acceptability, and Efficacy of CBT-Day
Background: Depression is more prevalent among autistic adolescents than non-autistic adolescents and associated with distress and safety concerns. Emotion dysregulation and negative self-esteem may be key intervention targets, as they are salient risk factors for adolescent depression and endorsed frequently in autism. However, interventions for depression in autistic adolescents are limited, and neither emotion dysregulation nor negative self-esteem have been formally tested as treatment targets. Although Cognitive Behavioral Therapy (CBT) is a leading intervention for adolescent depression, it lacks an evidence base in depressed autistic adolescents. Furthermore, specialized depression interventions designed for and with autistic adolescents have not been developed and tested.

Objectives: In this pilot nonrandomized trial, we examined the preliminary feasibility, acceptability, and efficacy of a novel community-informed, autism-adapted group CBT intervention, Cognitive Behavioral Therapy for Depression in Autistic Youth (CBT-DAY), in targeting emotion dysregulation and negative self-esteem to improve depression symptom severity in adolescents.

Methods: The sample included 24 autistic adolescents (7 cisgender females, 12 cisgender males, 5 non-binary; M_age=13.62) with elevated depressive symptoms who participated in the 12-week CBT-DAY intervention. Feasibility was assessed by attrition, session attendance, and success of data collection, while acceptability was assessed by family ratings at intervention conclusion. Parent- and self-report measures of hypothesized intervention mechanisms (i.e., emotion dysregulation, self-esteem) and the primary clinical outcome (i.e., severity of depressive symptoms) were collected pre-intervention (T1), at intervention midpoint (T2) and at intervention conclusion (T3). To explore potential changes in related clinical outcomes (i.e., internalizing symptoms), families completed additional questionnaires. A series of linear mixed-effects models, with timepoint as a fixed effect and participants as random intercepts, were employed to examine changes in target mechanisms and primary and exploratory clinical outcomes over time.

Results: The CBT-DAY intervention was feasible to implement in an outpatient setting given relatively low attrition (4/24; 16.67%), high session attendance (85%), and high success of data collection (90%). The majority of adolescents (86%) and parents (95%) were satisfied with CBT-DAY. Table 1 presents data from a series of linear mixed-effects models. Over the full duration of CBT-DAY (T1-T3), the target mechanisms of adolescent emotion dysregulation (EDI-7; β=-2.51, p=0.02, d=0.35) and self-esteem (RSES; β=-2.51, p=0.02, d=0.42) significantly improved. Adolescent depressive symptoms (RCADS) significantly improved over the full duration of CBT-DAY, per self-report only (RCADS-C Depression; β=-7.59, p<.001, d=0.68). Exploratory analyses revealed that adolescent total internalizing symptoms significantly improved over CBT-DAY from T1-T3, per self- (RCADS-C Total; β=-5.29, p=0.01, d=0.44) and parent-report (RCADS-P Total; β=-5.51, p=0.01, d=0.40).

Conclusions: Findings suggest that CBT-DAY is feasible to conduct in an outpatient setting and highly acceptable to adolescents and parents. Participation in CBT-DAY is associated with significant improvements in the target mechanisms (i.e., adolescent emotion dysregulation, self-esteem), primary clinical outcome per self-report (i.e., depressive symptoms severity), and exploratory clinical outcomes (i.e., total internalizing symptoms), per parent- and self-report. A larger controlled trial is needed to robustly investigate the efficacy of CBT-DAY in targeting key intervention mechanisms and improving clinical outcomes.

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Background: Many adolescents with autism experience more loneliness, social isolation, and poorer friendship quality than their peers, resulting from difficulties with making friends and peer victimization (Cresswell et al., 2019; Mazurek, 2013). The Social Tools And Rules for Teens (START; Vernon et al. 2016) Program is an intervention for increasing social competencies and motivation while reducing autism-related social communication challenges. This program for adolescents with autism combines a 20-topic social curriculum with immersive experiential learning with peers during unstructured socialization periods to provide a supportive, natural context for social experimentation and skill building.

Objectives: The aim of this study was to compare the outcomes from post intervention to the outcomes at a follow-up period of a telehealth adaptation of the START Program to see if treatment gains were sustained. Specifically, we assessed the parent reported social skills, social motivation, and emotion regulation and adolescent self-reported social skill use. We hypothesized that adolescent and parent reports would show a significant improvement in social skills, social motivation, and emotion regulation from pre to post, and at the follow-up period. Additionally, we hypothesized that participants’ social skill use coded from naturalistic conversations would improve from pre to post and at follow-up.

Methods: Participants were 12 adolescents with autism aged 12-16 (Mean age= 14.25) and their parents. Inclusion criteria included the use of full sentence phrases to communicate, the ability to respond to and ask questions, a verbal IQ ≥ 70, and verification of their autism.
diagnosis. Participants were diverse across genders (41.7% female) and racial and ethnic identities (16.7% Latinx, 50% white, 25% Asian, and 25% other or mixed race). The bi-weekly START Connections program consisted of an individual therapeutic check-in, group socialization time, group discussion and practice of 20 social skill topics, group activity, and individual checkout via Basecamp and Zoom software programs. Pre intervention data was collected within 2 weeks of the program beginning, post intervention data was collected within 2 weeks of the program ending, and follow up data was collected between 20 and 22 weeks after the program ended.

Results: Results indicate that socialization measures significantly improved following participation in telehealth START. Using repeated measure ANOVAs and paired sample t-tests, analysis of treatment gains in START participants yielded significant changes at both post and follow-up time points (p <.05) with medium to large effects on several parent-report and adolescent self-report measures including: emotion regulation (EDI; d= .57), autism symptom severity (SRS-2; d= -.5), social skill use (SSIS; d= .67) and social motivation and competency (SMCS; d= .58). Additionally, significant improvements in individual target skills (questions asked and comments made) were observed for 75% of participants through observations of naturalistic conversations with unfamiliar peers and these gains were found to be significant from pre to follow up (p <.05).

Conclusions: Results show promise for the telehealth START model in improving social communication in autistic teens and sustaining gains after the intervention is complete. These results warrant a full scale RCT study to determine efficacy of this program.

405.300 (Poster) Comparing the Effectiveness of Two Virtual Job Interview Interventions: Community Adaptation Matters

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Background: Two virtual job interview interventions have yielded initial support via randomized controlled trials (RCTs) for their real-world effectiveness at increasing competitive employment rates. The first intervention, Virtual Reality Job Interview Training (VR-JIT), has mostly been evaluated among adults with serious mental illness. A pilot RCT found that VR-JIT improved interview skills and vocational outcomes among young autistic adults. Subsequently, we used community-engaged methods to adapt VR-JIT into the second interview intervention: Virtual Interview Training for Transition Age Youth (VIT-TAY). The adaptation process was facilitated by 21 autistic transition-age youth, 4 employed autistic adults and 20 teachers, parents, and employers who reviewed VR-JIT and made recommendations to tailor it for autistic transition-age youth. Recently, VR-JIT and VIT-TAY were delivered and evaluated across 47 pre-employment transition services (Pre-ETS) programs for 635 youth with disabilities. Both evaluations found the interventions to be effective at increasing access to competitive employment across their respective samples. However, VR-JIT and VIT-TAY have not yet been directly compared regarding their effectiveness for autistic transition age youth.

Objectives: To conduct a secondary data analysis to compare intervention engagement and competitive employment outcomes among autistic transition-age youth who used VR-JIT or VIT-TAY.

Methods: Forty-seven schools were recruited to participate in a quasi-experimental study of either VR-JIT (15 schools, n=279 youth with disabilities) or VIT-TAY (32 schools, n=356 youth with disabilities) within Pre-ETS programming. Fifty-five staff were trained to fidelity to implement VR-JIT or VIT-TAY. Sixty autistic youth used VR-JIT, while 75 autistic youth used VIT-TAY. The proposed implementation strategy for each intervention occurred over 6-8 weeks with 1-3 virtual interview sessions per week. A prior evaluation of the participating schools found no differences between school type (VR-JIT vs. VIT-TAY; regarding how, where, when, and by whom, the virtual interview interventions were delivered). All schools monitored and reported student competitive employment outcomes by six-month follow-up. We used t-test, chi-square, and logistic regression analyses to evaluate study outcomes.

Results: Groups did not differ with respect to their number of completed virtual interviews (VR-JIT: M=11.5 [SD=7.3] vs. VIT-TAY: M=10.6 [SD=8.8]; p=.53), while the VR-JIT group spent more time in virtual interviews compared to the VIT-TAY group (M=213.5 [SD=119.7] minutes vs. M=160.3 [SD=129.6] minutes; p=.01). The VIT-TAY group, compared to the VR-JIT group, had a higher unadjusted employment rate (57.3% vs. 40.0%, p=.045). The VIT-TAY group, compared to the VR-JIT group, had greater odds of competitive employment by six-month follow-up (OR=3.1, p=.01) after adjusting for employment-related covariates (age, sex, reading level, IQ, prior employment, and co-occurring disabilities).

Conclusions: Autistic transition-age youth had stronger employment outcomes after using VIT-TAY—an intervention tailored by their community—compared to VR-JIT, which was designed for adults with serious mental illness. This finding is critical as Pre-ETS currently lack evidence-based practices to support job interview training. Notably, youth using VR-JIT spent more time practicing their interview skills; however, VIT-TAY was adapted to intentionally shorten the length of the virtual interview sessions. Overall, VIT-TAY is emerging as an evidence-informed option for autism services (e.g., Pre-ETS) that requires scientific replication.

405.301 (Poster) Comprehensive Therapy for Irritability in Adolescents with Autism: Study Design and Pilot Data

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Background: Approximately 50 percent of children and adolescents on the autism spectrum experience significant irritability, such as being easily frustrated or having frequent and impairing anger outbursts. Strikingly, no evidence-based psychosocial interventions are available for autistic adolescents who experience clinically significant irritability. To address this gap, we are conducting a treatment study of a novel intervention aimed at helping adolescents develop emotion regulation skills to handle frustration and navigate challenging social situations.

Objectives: This presentation will describe the design of the ongoing randomized controlled trial and present the results of an open pilot study.

Methods: The randomized controlled trial of Comprehensive Therapy for Irritability in Autism (CTIA) enrolls 12-to-19-year-old autistic adolescents with significant levels of irritability. Primary outcome measures include the Aberrant Behavior Checklist (ABC) Irritability subscale, the Modified Overt Aggression Scale (MOAS) and the Clinical Global Impression - Improvement (CGI-I) scale completed by an independent evaluator (a.k.a. “blinded” rater). Outcome measures are collected at study midpoint (week 8), endpoint (week 16) and six-month follow-up (week 42). CTIA consists of 15 ninety-minute weekly sessions delivered either in person or by telehealth using a detailed manual and targets both common and ASD-specific mechanisms of irritability. It includes illustrated activities for teaching emotion regulation and problem-solving skills to the adolescent; a parent component that teaches antecedent management and reward strategies; and a school component for addressing behavioral difficulties at school (Fig1). The study uses Psychoeducation and Supportive Therapy as a control condition because during adolescence, many individuals with ASD may become more acutely aware of their differences from peers and may benefit from psychological support.

Results: In preparation for the randomized trial, CTIA was piloted in eight adolescents with ASD complicated by irritability. Subjects included seven boys and one girl with ASD, mean age=14.3±1.4 and mean IQ=94.6±12.8. Six subjects were receiving medication (aripiprazole, citalopram, quetiapine, atomoxetine, and sertraline) that had been stable for at least six weeks prior to initiating CTIA and remained stable during the study. For consistency with clinical trials of medication for disruptive behavior in ASD, we used the ABC Irritability subscale as an outcome measure in this pilot. Treatment significantly reduced the mean ABC Irritability score from 19.0±4.0 at baseline to 6.9±2.3 at endpoint (paired samples t=10.6, p<0.01)(Fig2). Of note, the 12-point reduction in the ABC Irritability score is a clinically meaningful change and is similar to the mean improvement in drug trials.

Conclusions: Comprehensive therapy for irritability in autism consists of 15 ninety-minute weekly therapy sessions conducted with the teens and their parents. During treatment, adolescents learn emotion regulation and problem-solving strategies for managing frustration, and parents learn practical skills for coaching their children to acquire emotional resilience in potentially frustrating situations. If proven effective, this will become a useful treatment option for adolescents with autism complicated by disruptive behavior. Most importantly, we hope that this treatment will improve the lives of adolescents on the autism spectrum by building their confidence and empowering them to navigate increasingly complex social situations in the transition from adolescence to adulthood.

405.302 (Poster) Design Your Own Supportive Lifeworld: An Enactive Approach
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Background:

Supportive technologies for autistic young adults are promising in principle, yet their uptake remains limited. Critics argue that many supportive technologies have their origins in healthcare and thus are designed to teach autistic people – children, usually – skills that they supposedly lack. Overall, there is a strong focus on functional limitations, with little attention to the real-life experience that users have with these technologies. This may evoke a sense of disempowerment and result in the rejection of valuable supportive technology.

Objectives:

Lived experience has recently gained attention in enactive psychiatry, which foregrounds a holistic understanding of autism. Treatment rationale should consider the real-life physical and social environments in which autism manifests itself, other than only its pathological features as a ‘brain disorder’. By focusing on the lived experience of autistic people within their unique environments, it also becomes easier to tailor effective therapeutic interventions.

Inspired by enactive psychiatry, the aim is to bring the lived experience of autistic individuals also to supportive technology design. In the ongoing Design Your Life-research project (DYL), we are developing a toolkit that helps young autistic adults design supportive technologies based on their own preferences. The toolkit should help (1) users to explore and map their physical and social environment, (2) understand the supportive role that technology can play in that environment and (3) bring technology to fruition.

Methods:
Over the course of two years, the DYL-toolkit was developed at the intersection of design research and psychiatry. First, we investigated which design tools and techniques could be used for the collection and analysis of experiential data. Second, we investigated how the context of design - context-mapping, idea generation, testing, evaluation, reflection - could help young autistic adults learn more about themselves and their personal support needs.

To answer these questions, we initiated eleven design case studies with autistic young adults - including their caregivers, if applicable - each time trying out a different version of the toolkit. Data was analysed using a grounded theory approach.

Results:

The toolkit was completed in October 2022, consisting of twenty-six design tools. Among others, the Think-Tell-Recognize-tool helps users to reflect on sensory, sensorimotor, social and emotional components of supportive technologies they are already using. At the end of the design process, the My Solution in My Lifeworld-tool helps users to investigate how these components can be further enhanced or improved in a follow-up design iteration. For these and other tools, the emphasis is on experiential knowledge.

Conclusions:

From the case studies, we observed that the toolkit was indeed used to develop supportive technology going beyond only functionality: users considered aesthetics and existing routines and social networks in which the technology would interfere. Whenever the user was asked to clarify their design decisions, this seemed to provoke delicate discussions about one’s situation – regarding existential, family or domestic affairs –, yet shifts ‘responsibility’ from the autistic person themselves to their surroundings. Design empowers a person to reflect on their own lifeworld and personal, pragmatic support needs therein.

405.303 (Poster) Development of a Group-Based Job Interview Training Program with 3D Computer Graphic Humanoid Robots for Individuals with Autism Spectrum Disorders

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Background: Job interviews are significant barriers to employment for individuals with autism spectrum disorders (ASD), as nonverbal and verbal communication with multiple interviewers, required routinely in job interview setting, may be challenging for them. Recent data published by the Office for National Statistics show that only 22% of adults with ASD are in any kind of employment that imply an urgent need for intervention. Obtaining job interview training remotely during this covid pandemic may prove to be an indispensable skill, for individuals with communication barriers.

Objectives: To facilitate interview skill acquisition for individuals with ASD while staying at home, we developed a new group-based online training program using a novel robotic conferencing system in which the users can talk to each other virtually using 3D computer graphics (CG) of a humanoid robot as their own avatar. This study was conducted to investigate the effectiveness of the proposed program in facilitating interview skill acquisition required for face-to-face job interviews.

Methods: This study was approved by the ethics committee of Kanazawa University. The study included individuals aged 20–29 years, unemployed, seeking employment, and with a diagnosis of ASD based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). They were divided into three groups consisting of five individuals. The group members participated in the program sessions where they alternately played the roles of interviewer, interviewee, and meta-evaluator for eight or nine days over three consecutive weeks. During the sessions, mock job interviews were held in an online robotic conferencing system where an interviewee and two interviewers used their own CG robots as proxy agents (or avatars). Subsequently, meeting with remaining two members were held over a conventional online video conferencing system (Zoom®) to provide the interviewee with feedback about his last performance. For feedback, the interview scene with CG robots was replayed while preparing the scoring for both verbal and nonverbal communication. The participants underwent a mock face-to-face interview (MFI) with two experienced human interviewers, both before and after the program.

Results: Fourteen participants who completed the trial procedures, without any technological challenges or distress leading to session termination, were analyzed. In subjective evaluations by experienced psychotherapists, a significant increase between the first and the second MFIs and the second MFI in several aspects in both verbal and nonverbal aspects, such as appropriate word use (3.86 vs 5.00, \( p = 0.017 \)) and appropriate eye contact (3.00 vs. 4.29, \( p = 0.002 \)).

Conclusions: The results showed the potential efficacy of the proposed method in facilitating remote interview training at home. The current program allowed participants to obtain the experience of being an interviewee and performing evaluating roles as an interviewer and a meta-evaluator; therefore, it can be expected to understand others’ perspectives (i.e., the perspectives of the interviewer and meta-evaluator). Further evaluations need to be conducted to verify this interpretation and the efficacy of the proposed method as compared to
Background: The ongoing COVID-19 pandemic, a major stressor, has impacted the mental health of youth. Those on the autism spectrum are also at risk of encountering mental health problems in present times. To prevent the consequences of stress, we implemented the De-stress for Success© program within eight high schools with the objective of sharing scientifically valid knowledge on stress and coping strategies with autistic students. This program comprises of five workshops given once a week, group exercises and a student logbook. Because of intermittent school closures due to the spreading of COVID-19, workshops were given online (11.3%) or in class.

Objectives: To estimate the effects of the adapted De-stress for success program on the perception of stress and adaptive behaviours of autistic students

Methods: We proceeded with between-subject analyses of repeated measures. Before attending the five workshops (T1), one week after the end of the program (T2) and five weeks later (T3), 50 autistic students (M = 14.7, SD = 1.07; 8 girls; M IQ = 93.89, SD = 16.57), their parents and their teachers completed the Behavior Assessment System for Children (Reynolds et Kamphaus, 2015). Students also completed a Facial recognition test of six emotions (Diehl-Schmid et al., 2007), the 10-item Perceived stress scale (PSS; Cohen, Kamarck et Mermelstein, 1983) and a translated version of the Stress Survey Schedule (SSS; Groden et al., 2001). They answered verbally to a satisfaction and retention of knowledge questionnaire at T2.

Results: Students’ perception of stress (PSS), reaction to different stressors (SSS), maladaptive and adaptive behaviours (BASC) did not change in time. They identified the facial expression of emotions with higher success (F(2,82)= 4.094, p<.05, R²=.091), namely joy and disgust. As for their teachers, they perceived a positive impact on problematic behaviours (e.g. somatization F(1.528,55)= 6.417, p <.01, R²=.151; atypicality F(2,72) = 3.531, p <.05, R²=.089) and adaptive behaviors (e.g. adaptability F(1.648,59.132)= 8.145, p <.001, R²=.185; functional communication F(1.706, 61.425)= 11.284, p <.001, R²=.239). Parents on their part perceived less behaviors related to hyperactivity (F(2,34)= 3.628, p <.05, R²=.158) and tendency towards less anxiety (F(2,34)= 3.135, p =.056).

Overall satisfaction was high: 88% would recommend the program to their friends. Those who received the workshops online would have preferred to have been in class. More than half of the students did not appreciate nor find the logbook useful (56%). They retained the basics of the program. However, only 20% mentioned applying the knowledge and changing their behaviours. Nearly 2/3 (64%) said their teacher or parents did not support them in reinvesting the knowledge outside the workshops.

Conclusions: Workshops did not have the expected results on the perception of stress and adaptive behaviours as perceived by the participants. Teachers and parents saw a change in adaptive and maladaptive behaviours. Based on satisfaction interviews with the youth, we recommend avoiding online implementation of the workshops. Finally, reinvestment of knowledge in day-to-day activities is necessary to reinforce the generalization of skills with the help of the main actors in the youth’s environment.

Objectives: To evaluate if BBAT may be effective for improving movement quality in people with autism.

Methods: People with autism, 15-30 years were randomized to either an individual BBAT intervention of 12 weekly sessions and treatment-asusual, or to a control group receiving treatment-asusual only. Winsteps transformed data of BAS MQ at baseline and post-intervention were used to analyze changes in movement quality for each group.
Results: The preliminary results indicate significant improvements in BAS MQ for 7 out of 28 participants in the intervention group, while none had deteriorated. In the control group, there was no significant changes. Three participants discontinued participation due to high anxiety from travelling to and from the sessions.

Conclusions: The preliminary result suggests that BBAT may be a method to improve movement quality in people with autism. The special needs in autism require being acknowledged in all service delivery. Further clinical trials of BBAT should be carried out to investigate possible impacts on everyday functioning.

405.306 (Poster) Effects of Transcranial Direct Current Stimulation of the Bilateral Tpj on Neural Correlates of Intention Attribution in ASD – Neural Outcomes of the Stimat Study
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Background: Transcranial direct current stimulation (tDCS) is an innovative treatment option for autism spectrum disorders (ASD), which has the potential to specifically target and improve altered patterns of brain activation and functional connectivity. The tempo-parietal junction (TPJ) is a key-hub within the “social brain” and shows decreased activation in individuals with ASD, making it a promising target region for brain stimulation ASD. To characterize neural changes elicited by tDCS, testing electroencephalography (EEG) combined with a TPJ related neurocognitive paradigm as outcome in a randomized-controlled clinical trial can help track changes in neural functioning and elucidate neural mechanisms underlying effects of tDCS.

Objectives: The present study has two objectives. First, we will show results of the adaption and evaluation of an EEG paradigm assessing intention attribution, in order to establish event-related potential (ERP) markers of social cognitive functioning in children and adolescents with and without ASD. Second, we will report neural change captured by ERPs induced by anodal tDCS over bilateral TPJ within a phase-IIa randomized-controlled clinical trial.

Methods: The European multi-centre, phase-IIa pilot randomized, double-blind, sham-controlled, parallel-group clinical trial StimAT investigated the effect of 10 days of 20-minute multi-channel tDCS stimulation of the bilateral TPJ at 2.0 mA in combination with a computer-based cognitive training on core ASD symptoms in 24 children and adolescents with ASD aged 10 to 17. One outcome measure were ERP components recorded during the “sequential comic strip paradigm”, which captures the attribution of intentions and related neural processes of contextual integration and processing of expectations. ERPs were assessed prior to tDCS treatment (T2), directly afterwards (T3) and at 4 weeks follow-up (T4). The paradigm was previously adapted and analyzed in a sample of 26 children and adolescents with ASD and 24 typically developing controls.

Results: Results from the cross-sectional data show that contextual integration during intention attribution, represented by a P3-like component, are not per se altered in ASD. Instead, higher amplitudes in later prefrontal and parietal components indicate stronger processing of incongruent information in the context of intention attribution in ASD. Analysis of the longitudinal data is still ongoing, but first results indicate that TPJ associated P3 components are not enhanced by tDCS.

Conclusions: Combined EEG and neurocognitive paradigms are a helpful tool to characterize and analyze the effects of tDCS interventions, but tDCS may not have the anticipated direct effects on TPJ function.

405.307 (Poster) Efficacy and Social Validity of the Polish Version of the PEERS for Young Adults Curriculum: A Randomized Controlled Trial
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Background: Although most autistic people express interest in friendship and romantic relationships (Strunz et al., 2017), they report having fewer friends, less often having romantic relationships, and receiving less social support than non-autistic people (Bishop-Fitzpatrick et al., 2018). PEERS for Young Adults is an evidence-based program aimed at teaching social skills needed to establish and maintain close relationships, including friendship and romantic relationships.
Objectives: To examine the efficacy and social validity of the culturally adapted version of the PEERS for Young Adults in Poland.

Methods: Fifteen young adults (aged 18-32; $M_{age} = 23.5; SD = 4.2; 73.3\%$ males) were randomly allocated to a Treatment Group (TG) or a Waitlist Control Group (WCG). All the adults were diagnosed with autism spectrum disorder and had no intellectual disability, as confirmed by the administration of the Autism Diagnostic Observation Schedule (2nd edition) and the Abbreviated Battery of the Stanford-Binet Intelligence Scales (5th edition). Young adults and their parents reported on the outcome measures before the intervention phase (T1), after the intervention phase (T2), and at the 6-month follow-up (T3 for TG; T4 for WCG). Outcome variables included social difficulties related to the autism spectrum (Social Responsiveness Scale-2; SRS-2; Constantino & Gruber, 2012; and Autism Spectrum Rating Scales; ASRS; Goldstein & Naglieri, 2010), knowledge about social skills (Test of Young Adult Social Skills Knowledge; TYASSK; Laugeson, 2017), empathy, including social cognition (Empathy Quotient; EQ; Baron-Cohen & Wheelwright, 2004), and social engagement with peers (Quality of Socialization Questionnaire; QSQ; Laugeson, 2017). Treatment fidelity and social validity of the intervention were also measured. The lockdown imposed due to the COVID-19 pandemic forced the authors to move the last seven (out of 16) sessions of TG to an online setting, while WCG received all the sessions in person.

Results: As compared to WCG, young adults that completed the PEERS program showed significant improvements in self-reported knowledge about social skills (TYASSK), parent-reported level of autism-related difficulties (SRS-2 and ASRS total scores), the parent-reported quality of socialization with peers (ASRS Peer Socialization subscale), and the parent-reported (but not self-reported) social engagement (QSO). The effects were medium for social engagement and large for the rest of the variables ($\eta^2 > .14$) and were maintained over six months after the treatment, except for the social engagement (QSO). There was an additional gain in empathy, that was not significant immediately after the treatment. The intervention was well-accepted and deemed feasible by young adults, their parents, and peers involved in the program. Treatment effects were comparable across delivery modes (mixed online/in-person vs. in-person).

Conclusions: The study represents one of the few cultural adaptations of the social skills programs for autistic adults. It provides initial evidence for the sustained effects of this intervention in improving the social skills, social cognition, and social knowledge of young adults on the autism spectrum, although gains in social engagement were limited. Moreover, the Polish adaptation of PEERS for Young Adults showed high feasibility and acceptability that should foster its successful implementation.

405.308 (Poster) Elaborative Reminiscence with Children and Young People: A Systematic Review


Background:

Forty five percent of children with Autism Spectrum Disorder (ASD) show no additional language or intellectual disabilities and attend mainstream schools, yet their long-term outcomes are poor (Baird et al., 2006). Poorer quality of life in older autistic adults (Roestorf, 2018) has been associated with difficulties with theory of mind (ToM; Baron-Cohen, 1995), autobiographical memory (Bowler et al., 2007; Crane et al., 2009) and self-understanding (Lind, 2010) have been associated. Despite their poor long-term outcomes, school-aged children with ASD have access to few theoretically informed and empirically supported interventions. This makes the development of effective evidence-based interventions an urgent priority.

A growing body of research has reported encouraging findings on the relationship between training parents to speak more elaboratively (“elaborative reminiscence”; ER) and improvement to child outcomes, including memory and mental-state understanding (Fivush et al., 2006, Salmon and Reese 2016, Waters et al., 2019). Such findings have prompted speculation that ER could be a beneficial intervention for children with autism (McDonnell et al., 2017). However, systematic reviews of ER effectiveness have been narrow in scope, only reporting results for a small number of child outcomes and only for young (≤ 5 years), neurotypical children (Wu & Jobson, 2019, Waters et al. 2019).

Objectives:

A systematic review and meta-analysis was conducted to address the limitations of previous reviews by evaluating the impact of an ER intervention on a broad range of outcomes (e.g., cognitive, emotional, behavioural and social) for all children up to 18 years, unrestricted by diagnostic status. Moderators of ER effects were also investigated according to training, participant and ER characteristics.

Methods:

Unique articles were identified from searches of three EBSCO interface databases, the Web of Science database, clinical trial registers and grey literature searches. Literature was independently screened by two authors according to pre-specified criteria to include experimental ER studies that assessed quantitative child outcomes. Data were qualitatively synthesised in accordance with guidance from Popay et al. (2006) and meta-analysed where possible according to outcome categories.
Results:

The search screened 2350 records and included 10 articles. Results suggest significant benefits of ER for children’s memory, receptive vocabulary, use of emotion content during reminiscence, and indirect ER benefits were reported by one study for children’s ToM. ER was not found to improve children's expressive vocabulary, narrative quantity, story comprehension, or behaviour. Older child age and shorter intervention length were found to improve effect sizes for child memory and ER interventions that included more emotion-talk were also associated with improved outcomes. The review identified no studies that investigated ER effectiveness with neurodiverse populations.

Conclusions:

The fact that these findings show that ER can benefit outcomes for neurotypical children in areas of known difficulty for high-functioning children with autism suggest that an ER intervention could have promising clinical implications for children with atypical development or developmental disabilities (e.g., autism). Results from this review informed the design and implementation of a randomised pilot study that investigated the feasibility and acceptability of an ER intervention for autistic children aged 7-12 years.

405.309 (Poster) Emotion Regulation Program for Children with Autism Spectrum Disorder and Intellectual Disability – Preliminary Findings

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Background:

There is a high concordance rate of anxiety and other emotion-related issues with Autism Spectrum Disorders (ASD). Cognitive Behavioural Therapy (CBT) programs developed to address emotion issues in individuals with ASD have largely been used with individuals with intact cognitive functioning.

Objectives:

We aimed to examine the efficacy of an emotion regulation program based on CBT principles adapted for ASD individuals with lower cognitive abilities in the community. The intervention program was adapted from an original CBT program (Sung et. al., 2011; Goh et al., 2017) to be conducted in a small group setting in the school environment, with a 1:3 teacher-to-students ratio. The program was conducted over fourteen 60-minute sessions.

Methods:

Seventeen children ($M_{age} = 12.5$ years old, $SD = 2.79$) from 2 special education schools with a diagnosis of ASD and intellectual disability (ID) were randomized into either the intervention group ($n = 9; M_{age} = 13.7, SD = 2.41$) or waitlist control group ($n = 8; M_{age} = 11.07, SD = 2.59$). Participants were assessed on the Social Responsiveness Scale – parent report (SRS-2; Constantino 2012), and the SPENCE Children Anxiety Scale (SCAS; Spence 1998) before and after the program.

Results:

A one-way ANCOVA was conducted to compare pre-post differences between the Intervention and Control group, while controlling for age. There was a significant improvement in the SRS communication domain scores for the Intervention group, $F(1,14)=7.705, p=0.015$, as compared to the Control group. On the other hand, children in the Control group reported a significant reduction in the SCAS-Child fears of physical injury score, $F(1,14)=6.447, p=0.024$. No other significant differences were found on the other measures.

Conclusions:

Our results suggest that an emotion regulation program can be beneficial to ASD individuals with ID, when the program is adapted to meet their verbal, behavioral and cognitive level of understanding. Although we did not find significant reductions in anxiety related symptoms, participants in the intervention group were reported to display improvements in their communication. Replication of the study with a larger sample is needed.

405.310 (Poster) Employer Workshops in Concrete Communication - Supporting a Neurodiverse Workforce

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Background: Current research demonstrates that awareness of neurodiversity among supervisors and co-workers results in improved morale and increased productivity through maximizing talents and putting all employees in positions to succeed (Krzeminska et al., 2016). As neurodivergent individuals achieve employment in a range of careers and settings, it is clear there are specific areas of need impacting their success within the workplace. This study aims to evaluate the efficacy of an employer-based training intended to support greater awareness of neurodiversity and provide concrete communication strategies effective for all employees.

Objectives: We partnered with one large employer to pilot our workshop that we developed on the topic of concrete neurodivergent-friendly communication principles. Our training is based on leveraging current evidence-based practices related to universal design, neurodiversity, and neurodivergent success in the workplace. We proposed to: (1) conduct a pilot survey to establish the current baseline of staff awareness of neurodiversity, (2) assess the implementation of neurodivergent-friendly communication practices, (3) re-assess awareness of neurodiversity and neurodivergent-friendly communication techniques in the populations receiving training.

We hypothesized that by increasing neurodiversity awareness and promoting neurodivergent-friendly communication practices and tools, employee morale and inclusion will be enhanced.

Methods: To accomplish these aims, the study is made up of three components: (1) a brief online pre-survey addressing topics of neurodiversity awareness and use of concrete communication strategies (2) participation in a neurodiversity awareness and concrete communication strategy workshop (3) a brief online post-survey addressing the same topics as the pre-survey. Participants included only employees at one specific partner employer. Participants (N=34) took the pre-survey one month prior to the workshop, then attended the workshop, then took the post-survey one month after the workshop (N=13, still in process of collecting). Study survey participation and training took place entirely online.

Results: Preliminary results show: 8 out of 34 participants reported having never heard of the term “neurodiversity” prior to the survey; participants reported (1) an increase in co-workers’ awareness of neurodiversity from before the workshop (between 40-50% awareness, depending on the department) to after the workshop (60-70% awareness), (2) a decrease in use of concrete communication strategies decreased following the workshop, and (3) that they would like additional training in neurodiversity and concrete communication.

Conclusions: Preliminary results indicate that additional training, beyond just one neurodiversity-focused workshop, is needed to make a lasting change in a particular workplace. The reported Autistic self-advocates, other communities of neurodivergent adults, and those working with these communities have increasingly highlighted the potential societal contributions available when the workforce recognizes and develops the strengths of individuals with diagnoses of Autism, ADHD, Dyslexia, etc. Rather than pathologizing the weaknesses of neurodivergent individuals, it is paramount that we promote strategies to successfully include the full range of human neurodiversity in the workforce (Doyle, 2020). As not all neurodivergent individuals are aware of or comfortable disclosing their neurodivergent status, it is essential for employers to increase implementation of communication strategies that are effective for a diverse workforce.

Background:

The ‘Roim Rachok’ Program (RRP; "Looking Ahead" in Hebrew) is an innovative program designed to integrate cognitively able young adults with autism spectrum disorder (ASD) within the Israel Defense Forces (IDF) and the civilian work world. The first phase in the program is a three-month training course prior to army recruitment provides professional training, along with social communication skills, work and life skills, yoga, and emotional support adjusting to military life.

Objectives:

1. Examine changes in self-reports among the ASD group in adaptive behavior, autism symptom severity, and social communication abilities over time. 2. Compare self-reports of the ASD group to typically-developed (TD) soldier control group.

Methods: The study cohort was participants with ASD (n=49; Mage=19.09, 47:2 males to females) with average to above-average cognitive ability (ASD group) and TD soldiers (n=46) matched for gender/age and serving in the same units (control group). The ASD group underwent comprehensive evaluations at the training course’s beginning (T1) and end (T2); the control group was similarly evaluated only at T2, upon recruitment. Evaluation included standard measurements for adaptive behavior (Adaptive Behavior Assessment Scale 2nd edition- ABAS-II), autism severity (Social Responsiveness Scale 2nd edition- SRS-II), conversation skills (based on Yale in vivo Pragmatic Protocol- YiPP), theory of mind (“ToM”; Faux Pas), and empathy (Empathy Quotient- EQ).
Results:

From T1 to T2, a significant increase was noted in all three ABAS-II subdomains for the ASD group, suggesting substantial improvement in adaptive behavior over the training course (Figure 1). Additionally, a significant decrease in SRS-II social communication impairment (SCI) subdomain, an increase in the faux pas criteria for detecting and interpreting awkward statements and in EQ emotional empathy subdomain scores were noted. These findings may reflect the improvement of the participants’ social communication skills following the training course. Group comparisons in T2 yielded differences in most examined measures. TD soldiers scored significantly higher than ASD group in the ABAS-II total and social subdomain scores. ASD group scores were lower than TD soldiers in conversation skills total score and in specific background, topic maintenance, comments and asking for information subdomains. Regarding ToM capabilities, the ASD group did not differ significantly from the TD group in detecting and interpreting awkward statements in faux pas situations but did have lower scores interpreting non-faux pas situations as “neutral” compared to the TD group. Finally, the ASD group scored lower than the TD group on the EQ total and its cognitive and emotional subdomains (table 2).

Conclusions:

Positive changes in adaptive behavior and social communication were found among young adults with ASD matriculating into the IDF after the RRP training course. Improvement may be attributable to the course’s effectiveness, but lack of a control group within the course prevents a definitive conclusion. Nonetheless, comparison to matched TD peers at the time of IDF matriculation indicates some of the social-communication differences between the two populations. These findings characterize the potential challenges of integration into social-work environment, such as military service, and point to the appropriate support for a successful integration.

405.312 (Poster) Evolution of the Intellectual Structure of Virtual Reality and Augmented Reality Interventions for Children and Adolescents during the Period 2010-2022

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Background: Emerging technologies such as virtual reality (VR) and augmented reality (AR) are being increasingly used in interventions aimed at helping autistic children and adolescents. The reason is that they provide flexibility that can be adapted to different learning styles for this group. Also, the visual information they provide the user with can be the well suited for autistic children and adolescents.

Objectives: To analyze the intellectual structure of global trends in the use of VR/AR for learning by autistic students through scientific mapping in the period 2010-2022.

Methods: We have used a bibliometric methodology which is a group of techniques that allow us to scientifically map the representation of the intellectual structure in research areas. Similarly, the representation of the information collected in the documents were performed using the bibliometrix software. In order to extract the information to be processed in bibliometrix, a systematic review with inclusion and exclusion criteria has been applied, resulting in a final sample of 57 documents analyzed during the period 2010-2022.

Results:

The analysis of the intellectual structure based on the keyword Plus that the documents have in common shows two clusters. The first cluster includes adolescents (100%), “High Functioning autism” (90%), interventions (83.3%), with Ke et al. (2022) being the most relevant document. In the second cluster, individuals (90.9%), children (61.1%) and spectrum disorders (56.2%) stand out, and the most important document is Chen et al. (2015). The analysis based on the Keyword Authors shows five clusters of documents. In the first, autism spectrum disorder (100%), virtual reality (21%), augmented reality (25%) is relevant. Lee et al. (2018) is the study obtaining the highest impact. In the second cluster autism (100%), virtual reality (78.9%), augmented reality (75%) stands out. Ke et al. (2022) obtained the most relevant document. For the third cluster, the words augmented reality, 3d facial animation and emotions are similar in 100% of the publications. The paper by Chen et al. (2010) is in the most important position. In the fourth cluster, the words social competence, 3d expressive avatar, 3d virtual environments are present in 100% of the papers. The work of Cheng et al. (2010) receives the highest recognition. In the last cluster, ASD (100%), collaboration (100%) and autism spectrum disorders (55.6%) are the most prominent. The greatest impact in their research is for Burke et al. (2021).

Conclusions: We present illustrations showing that VR works with desktop virtual reality, being collaborative work one of the most used approaches, while AR has as its main objective the work of emotions and all the factors that influence them. The most recognized works are those of Ke et al. (2022) for VR and Lee (2021) for AR.

405.313 (Poster) Examination of Autism Knowledge, Self-Efficacy, and Educator Competence in Teaching Autistic Students
Examining Moderators of a Transition Intervention for Autistic Adolescents and Young Adults


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**Background:** Given the prevalence of diagnoses and educational classifications of autism, educators are likely to serve autistic students across a variety of school settings. Previous research has suggested that autism knowledge is insufficient among educators and that poorer understanding of autism may impact educator effectiveness (Gómez-Mari et al., 2021). However, inconsistent measurement of autism knowledge (Harrison et al., 2017) and limited scale of existing samples has hindered a fuller understanding of existing knowledge and how knowledge relates to educator efficacy.

**Objectives:** Evaluate levels of autism-related knowledge in a large sample of US educators using a psychometrically sound instrument; examine relations between Autism knowledge, self-efficacy, and knowledge of evidence-based inclusive educational strategies to serve autistic students.

**Methods:** A sample of 389 educators from across New York state participated in an online survey about knowledge and attitudes toward inclusion of students with disabilities. This survey included the Autism Stigma and Knowledge Questionnaire (ASK-Q), as well as multiple items assessing educators’ self-efficacy (including self-reported ratings of their knowledge about autism, knowledge of inclusive instructional strategies for autistic students, and their ability to prepare autistic students for adulthood). Finally, educators read a vignette describing an autistic student in an inclusive setting and were asked to nominate strategies they would use to support this student’s educational progress. Content analysis is being used (in progress) to score educator responses for the number and quality of evidence-based strategies educators were able to name in their open-ended responses.

**Results:** Most participants were female (77.3%). Over half of the participants were currently employed as a general education teacher (n=213, 54.8%), 118 were employed as a special education teacher (30.3%), 11 were school counselors (2.8%), 2 were paraprofessionals or instructional aides (0.5%), 13 were school administrators (3.3%), and 30 chose to describe their current position as “Other” (7.7%).

Self-reported autism knowledge among educators was generally high, with most participants demonstrating “Adequate” knowledge across subscales (diagnosis/symptoms – 94.3%, etiology – 98.4%, treatment – 95.3%) and only 3.4% of educators endorsing autism-related stigma. ASK-Q scores were positively and significantly correlated with educators’ self-rated autism knowledge (r = .153, p = .009), knowledge of inclusive instructional strategies for autistic students (r = .134, p = .002), and belief in their ability to prepare autistic students for adulthood (r = .106, p = .038). Relationships between ASK-Q scores and self-efficacy with educator ability to nominate evidence-based inclusive strategies will also be explored when content analysis is completed.

**Conclusions:** Initial results support the hypothesis that autism knowledge relates to educators’ self-efficacy and ability to support autistic students within the classroom, even among educators with relatively high levels of autism knowledge. Results from qualitative content analysis will further elucidate if factual autism knowledge and self-efficacy are significantly related to educators’ actual ability to nominate evidence-based strategies to help autistic students succeed in inclusive settings. These findings inform efforts to assess educator autism knowledge, identify training needs among educators, and improve educational interventions for autistic students.

**405.314** (Poster) Examining Moderators of a Transition Intervention for Autistic Adolescents and Young Adults

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**Background:** The TEACH School Transition to Employment and Postsecondary Education (T-STEP) has demonstrated efficacy. Compared to a waitlist group, students receiving the T-STEP made greater improvements in parent-reported executive function and self-determination and student-reported self-determination, anxiety, and depression (Klinger et al., 2021). Few studies have examined the differential efficacy of transition interventions to identify for whom the intervention may work best.

**Objectives:** The objective of the current study was to examine moderators of T-STEP efficacy to identify characteristics of adolescents and young adults (e.g., IQ and symptom severity) who benefit most from the program.

**Methods:** 92 autistic adolescents and young adults ages 16-21 (M=18.47, SD=1.18) with average to above-average IQ (M=105.89, SD=15.21) were randomly assigned to complete the 12-week (5 hours/week) T-STEP program (N=45) or the Waitlist Control group (N=47). 73.9% of the participants were male, 70.8% were White, 19.1% were Black, 7.9% were Asian, and 7.6% were Hispanic or Latino. At pre-test, caregivers completed measures of autism symptom severity using the Social Responsiveness Scale-2nd edition (SRS-2), and autistic participants completed the WASI Full-Scale IQ-2. During the pre-test and post-test, autistic participants completed anxiety ratings using the State-Trait Anxiety Inventory and self-determination ratings using the AIR Self-Determination Scale (AIR-SDS). At pre-and post-test, caregivers completed measures of workplace readiness using the Becker Workplace Adjustment Profile (BWAP-2), executive
function using the Behavior Rating Inventory of Executive Function- Adult version, and self-determination using the AIR-SDS. Linear mixed models tested the moderation of autism symptom severity and IQ on the T-STEP intervention comparing the T-STEP intervention group and the Waitlist Control group from pre-test to post-test of self-determination, work adjustment skills, and executive function. Moderation was tested by incorporating a three-way interaction of InterventionGroupXTimeXModerator.

Results: There were significant three-way interactions for parent-reported BWAP-2 work adjustment, Est. = 0.33, SE = 0.12, t(73.11) = 2.72, p = .01, and parent-reported AIR self-determination, Est. = 0.24, SE = 0.09, t(79.8) = 2.59, p = .01 (See Figure 1). Parents of students receiving the T-STEP with SRS-2 scores one standard deviation above the sample mean (T-Score= 76.19) reported the highest increases in work adjustment scores on the BWAP-2 and AIR-SDS compared to the waitlist group, as compared to individuals with sample mean SRS-2 scores (T-Score =67.14) or those with SRS-2 scores one standard deviation below the sample mean (T-Score= 58.10). No other statistically significant moderators were identified.

Conclusions: Autism symptom severity was a moderator of the intervention effect, indicating that students receiving the T-STEP with the highest parent-reported autism symptom severity ratings in the severe range on the SRS-2 had the greatest improvement in parent-reported work adjustment skills and self-determination capacity compared to students with lower levels of autism symptom severity ratings. Notably, autistic students with milder symptoms, below the SRS-2 diagnostic cutoff, showed less significant change. IQ was not a moderator of treatment efficacy. This analysis suggests that the T-STEP is an effective intervention for students with significant autism symptoms and that those with fewer symptoms may not need as intensive of an intervention.

405.315 (Poster) Explore the Impacts of Continuous Theta Burst Stimulation over the Left Dorsolateral Prefrontal Cortex in Autism: A Double-Blind Randomized Sham-Controlled Trial
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Background:

Despite previous open-label studies found the therapeutic potential of inhibitory repetitive transcranial magnetic stimulation (rTMS) over the dorsolateral prefrontal cortex (DLPFC) in autism spectrum disorder (ASD), there exist several methodological caveats especially lack of sham-controlled comparison group.

Objectives:

In our randomized, double-blind and sham-controlled trial, we aim to explore the feasibility and therapeutic effect of inhibitory continuous theta burst stimulation (cTBS, a modified variant of rTMS) over the DLPFC in individuals with ASD.

Methods:

We enrolled sixty intellectually able children and emerging adults with ASD (55 males/5 females, aged 8-30 years). Participants were randomized to a 16-session 8-week courses of cTBS (600 pulses/session)(n=30) vs. sham stimulation (n=30) targeting the left DLPFC. Outcome measurements included adverse events, clinical symptoms and adaptive and neuropsychological function at baseline, Week 8 and Week 12 (4 weeks after the last stimulation).

Results:

Most of the participants could tolerate the cTBS protocol. Ninety-eight percent of participants completed the protocol with mild and transient side effects. The Active stimulation was not superior to the Sham condition (null treatment by time interaction effects from baseline to Week 8 and to Week 12, respectively) on any clinical or neuropsychological metrics. We found remarkable time effects of 8-week cTBS on autistic symptoms and executive function from baseline to Week 8 and to Week 12, respectively, for both Active and Sham groups, with comparable effect sizes of changes in symptoms/cognition between groups. The response rates of 8-week cTBS over the left DLPFC were comparable between Active and Sham groups.

Conclusions:

Inconsistent with earlier findings, our RCT trial does not endorse that the inhibitory rTMS paradigm (cTBS) over the left DLPFC is an effective treatment for children and emerging adults with ASD. This study highlights the urgent need of double-blind and sham-controlled trials of rTMS/TBS for individuals with ASD, which is an infrequent practice in the existing literature.

405.316 (Poster) Factors Associated with Clinicians' Attitudes Toward the Delivery of Psychotherapy for Autistic Youth
**Background:** Despite evidence for the efficacy of psychotherapeutic approaches to address mental health challenges in autistic youth (Weston et al., 2016), they often struggle to receive interventions (Brookman-Frazee et al., 2012). Clinicians’ attitudes - their perceptions of the advantages and disadvantages of starting therapy – have been identified as an important correlate of clinicians’ intentions to deliver treatment (Maddox et al., 2019), though this work has largely focused on autistic adults. The Contact Hypothesis suggests that meaningful contact with, knowledge about, and experiences with individuals with disabilities are associated with positive attitudes and perceptions (Allport, 1954). It is important to understand, therefore, whether knowledge about autistic mental health and contact with autistic people may inform attitudes toward providing psychotherapy to autistic young people with mental health problems.

**Objectives:** To examine variables associated with clinicians’ attitudes toward delivering therapy for autistic youth.

**Methods:** Data were collected from 611 publicly funded clinicians across Ontario who provide psychotherapy to children and youth. Clinicians were 20 to 75 years old (M = 40.2, SD = 10.8; 84% Women; 79% White). Clinicians reported how favourable or unfavourable they felt towards delivering psychotherapy using opposite adjective pairs (e.g., Pleasant-Unpleasant, Good-Bad) and a sliding scale (10 to 0) (Fishbein & Ajzen, 2010). Clinicians self-rated their knowledge about mental health specific to autistic youth using a 5-point Likert Scale (1 = Not at All Knowledgeable; 5 = Extremely Knowledgeable; Maddox et al., 2019). They were asked if they knew an autistic person outside of their work (e.g., friends, family) and if yes, they were asked to report the frequency of contact with this individual (0 = No contact; 1 = Very rarely; 2 = Rarely; 3 = Occasionally; 4 = Frequently; 5 = Very frequently).

**Results:** Spearman’s correlations indicated that clinicians’ attitudes towards treatment were positively correlated with knowledge ratings (r = .48, p < .001) and their frequency of contact with an autistic individual outside of their work (r = .16, p < .001). Using multiple regression, clinician age was entered as a control variable, followed by knowledge and contact frequency. The model explained 21.8% of the variance in attitudes, with knowledge accounting for 18% (p < .001) and contact frequency no longer being a significant predictor (p = .39).

**Conclusions:** Our findings indicate that it may be important to increase knowledge about supporting autistic youth with mental health problems, and encourage contact with autistic people, given that these factors relate to clinicians’ attitudes toward treatment. There are several limitations to this research, including its correlational approach and the use of a single item to represent the frequency of contact. Future research could examine how clinicians’ attitudes toward providing mental health therapy may change following training initiatives and educational programs.

**405.317 (Poster) Factors Influencing the Sustained Use of Nine Programs from the Csesa High School Based Study for Autistic Students**

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**Background:** Although sustainability is one of the key phases of implementation frameworks (EPIS, NIRN) it is frequently an unstated aim of intervention and efficacy studies. Evaluations of the sustained use of interventions targeted in research is scarce, in part due to a lack of funding support. The data on the sustained use of each of nine intervention components in four areas (Social, Transition, Reading Comprehension, Independence & Behavior) that were part of a two-year CRCT study with 564 autistic youth is presented. This Institute for Education Sciences funded multi-site project – the Center on Secondary Education for Students with Autism (CSESAA) was conducted with 2 cohorts of 10 schools in each of three US states. The study model provided the opportunity to evaluate the sustained use of the targeted components for the 15 intervention schools from cohort 1 during the 3rd year.

**Objectives:**

- Identify which of nine program components implemented in 15 schools as part of a 2-year CRCT were reported to be used in the year following school participation.
- In the follow up year for 5 schools at one implementation site: Describe the fidelity of implementation for program components sustained; summarize responses to a Teaming and Impact survey and describe the impact of attrition of school personnel.

**Methods:** Data from a brief survey was collected from the site coordinator for each of the 15 intervention schools to determine which of the programs that were implemented with coaching sustained after the research ended. A mixed method evaluation of implementation was conducted at one of the sites for a dissertation study. Fidelity observations of sustained programs took place in schools. Site coordinators
completed a survey rating the teaming that occurred during the study and the impact of the study on students. Data on school personnel attrition was also obtained.

Results: Approximately 2/3 of the programs implemented during the two-year study were sustained at each of the three sites. Promoting Responsibility, Independence, and Self-Management (PRISM) was the only component implemented and sustained at all schools. Peer Supports (PS) and Alternative Achievement Literacy (AAL) were among the most sustained components and Transitioning Together (TT), Social Competence Intervention (SCI-H), and Collaborative Strategic Reading (CSR) among the least. There was a significant correlation at the .02 level ($r=.77$) between the percentage of the component sustained and the number of coaching sessions during the two-year study. Fidelity observations in the 5 schools at one site all achieved a score of 2.0 or more out of 3.0, which is considered moderate to high. There was a moderate and positive correlation between the mean score of the Teaming and Impact Survey and the number of components that sustained ($r=.68$).

Conclusions: The number of coaching sessions during the 2 year study was related to sustainment in the school. Other factors that also influenced sustainment included: if the component was similar to established programs in the schedule; if attrition in school personnel was high; if teams worked collaboratively; and if personnel found value in the program.

405.318 (Poster) Feasibility Study of Telehealth ESDM-Informed Caregiver Coaching Adapted for School-Aged Autistic Children with Co-Occurring ADHD


Background: Many autistic children have co-occurring ADHD. They are often diagnosed later, have more challenges with behavior, school functioning and friendships, and have caregivers with higher stress levels than those with autism alone. Effective services are needed, but medications are less effective and no therapy has yet been developed that supports the unique needs of autistic children with co-occurring ADHD.

Objectives: We evaluated the feasibility of a telehealth Early Start Denver Model (ESDM)-informed caregiver coaching intervention for school-aged autistic children with co-occurring ADHD. We offered 8 weekly, 1-hour coaching sessions and conducted a single arm pilot study to assess the acceptability, feasibility, and appropriateness of the approach and intervention impact.

Methods: Adaptations to traditional ESDM were documented using the Witseley Stirman Framework. Participants had confirmed DSM-5 diagnoses of ASD and ADHD. Mixed methods were used to assess acceptability, feasibility, and appropriateness of the approach, with qualitative data analyzed using directed content analysis and quantitative data analyzed using descriptive statistics. Impact on child and caregiver outcomes was assessed using longitudinal mixed effects models implemented in R (using lmer() from the lme4 package). Three specific adaptations were made to the intervention: (1) Strategies were included that support ADHD-related behaviors, while maintaining a primary focus on social communication; (2) The approach was adapted for older participants; and (3) Synchronous and asynchronous telehealth versions were developed. 24 caregiver-child dyads completed coaching. Participant mean age was 103 months (SD=20), mean IQ was 95 (SD=19), 75% were male, 42% were Black/more than one race, 30% had co-occurring conditions other than ADHD, and 75% were on a psychotropic medication. 80% of caregivers were mothers, 50% were not working, 35% reported household income less than the US median, and on average participants lived 50 miles from the study site.

Results: Caregivers reported the intervention was acceptable, feasible and appropriate, suggested adaptations to improve fit, and noted improvements (See Table 1). Caregiver ratings of coaching were high on 3 pragmatic measures of acceptability, appropriateness and feasibility (AIM mean=4.7/5, SD=0.4; IAM mean=4.6/5, SD=0.7; FIM mean=4.6/5, SD=0.5). Children demonstrated improvements in social communication abilities and decreases in ADHD-related behaviors. Joint Engagement Rating Inventory composite scores increased significantly over time ($t=3.74, p=0.006, ES d=1.25$). There was a significant increase in Vineland Adaptive Behavior Scales-3 Communication ($B=0.32, t=2.42, p=0.02, ES d=0.32$) and Socialization scores ($B=0.44, t=4.70, p<0.0001, ES d=0.57$). Social Responsiveness Scale-2 total t-score significantly decreased ($B=-0.33, t=-4.39, p=0.0001, ES d=-0.57$), as did total ADHD-Rating Scale score ($B=-0.32, t=-2.78, p=0.008, ES d=-0.70$). Caregivers learned to use intervention strategies and reported decreases in caregiver strain, reflected by ESDM caregiver fidelity ratings increasing significantly ($B=0.43, t=5.79, p=0.0001, ES d=1.87$), and Caregiver Strain global scores decreasing significantly ($B=-0.06, t=-3.38, p=0.002, ES d=-0.58$).

Conclusions: This feasibility study is an initial step towards addressing the intervention gap impacting school-aged autistic children with co-occurring ADHD. We demonstrated the approach was acceptable, feasible, and appropriate and positively impacted child and caregiver outcomes. A planned hybrid type I effectiveness-implementation trial will evaluate intervention efficacy and identify implementation determinants.
Feasibility of the Yoga Bali Program Intervention for Adolescents with Autism Spectrum Disorder and Their Parents: Exploring the Effect of Yoga Practice on Anxiety, Quality of Life and Attention.

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Background: Adolescents with autism spectrum disorder (ASD) and their parents are at risk of presenting low levels of quality of life (QoL). Comorbidities, such as anxiety disorder and attentional deficits, are known to be risk factors of a poor QoL in this clinical population. Among parents, lack of professional resources, feeling of social isolation and parental stress are transactional factors that contribute to reducing their QoL. Studies have suggested that yoga, as a complementary intervention for adolescents with ASD and their parents, can reduce anxiety and enhance QoL and concentration.

Objectives: Therefore, our study aims to explore the effect of yoga practice among adolescents with ASD and their parents using the model of attentional regulation of Gard and al. (2014) as a theoretical framework.

Methods: We first adapted the yoga Bali program to the needs of adolescents with ASD and their parents. An exploratory study on the feasibility of the program has been done with six families (6 adolescents with ASD: 5 boys; 1 girl; age: M = 15.17; SD = 1.83; 6 mothers; 2 fathers; age: M= 47.5; SD = 2.77) completing the 8 weeks yoga program. Participants responded to the TARF-R questionnaire and took part in semi-structured interviews. Anxiety symptoms, QoL and attention abilities were measured before and after the program with the MASC-2, WODQOL-Brief and D2-R. Nonparametric Wilcoxon rank comparison, descriptive and frequency analyses were run using SPSS 28 and thematic qualitative analyses were completed.

Results: Feasibility analyses showed a zero dropout rate with 93% of the participants that completed all the yoga classes. Of all participants, 71.5% reported that yoga helped them managed their anxiety. Qualitative analyses showed three key thematic brought up by parents: lack of professional resources, stress related to work and social cohesion in the program. In adolescents, two main thematic were highlighted: stress related to school and appreciation of the relaxation during yoga classes. Results showed no significant changes on the MASC-2 scales score of anxiety levels of symptoms. For parents, QoL global index score on the WHOQOL-Brief was significantly higher after the program (p < .05). For adolescents, concentration performance scores on the D2-R test were significantly higher after the program (p < .05).

Conclusions: Results suggest that the yoga Bali program has a good level of social acceptability and an acceptable feasibility. Our findings highlighted positive outcomes of yoga practice on anxiety, stress management, QoL and concentration levels. These results corroborate previous scientific findings and is in line with Gard and al. (2014) theoretical framework. Compared to previous studies, our study did not find significant changes in adolescents’ level of anxiety after their participation in the yoga program. Statistical test sensibility could have been reduced due to our low number of participants paired with high baseline levels of anxiety. Nonetheless, most participants perceived that yoga practice helped them manage their anxiety symptoms. Finally, our findings bring new insight on the effect of yoga practice and the social response to yoga as an intervention among adolescents with ASD and their parents.

Food Selectivity Inventory: Proof of Concept of a Novel Self-Report Measure


Background:

Food selectivity is a critical concern for many autistic school-age children and adolescents. As treatments for food selectivity are developed and refined, identifying meaningful, sensitive, and developmentally appropriate outcome measures is crucial. Existing measures capture treatment changes that may be too distal and do not reflect the incremental changes observed when expanding flexibility to eat new or nonpreferred foods. Moreover, existing food selectivity treatment outcome measures do not capture the direct, lived experience of autistic youth.

Objectives:

1. Develop the Food Selectivity Inventory (FSI), an online, picture-based assessment tool designed for child self-report.
2. Explore novel characterization variables that could be outcome variables in food selectivity treatment trials.
3. Evaluate preliminary psychometrics of the FSI.

Methods:
Eighty-seven autistic youth (7-16 years, M=10.8, SD=2.8; 26F:61M) and their parents completed the online FSI. Participants viewed pictures of foods within a particular food group or category (Figure 1) and indicated which foods they eat among those presented (food repertoire). Further ratings characterized novel possible outcome variables, including cognitive willingness, idiosyncratic eating, eating accommodations, and domain-specific impact (Table 1).

Results:

Across five food groups (grains, fruit, protein, dairy, vegetable), participants reported a food repertoire ranging from 3 to 53 (M=26.8, SD=26.8) of the 55 overarching food categories (e.g., berries, beans, green vegetables) presented. Participants then indicated a willingness to taste an additional 0 to 24 (M=6.5, SD=4.6) foods if they were asked. Thirty-two (36.8%) participants reported that their child is idiosyncratic about eating food. Of the foods participants reported eating, they described idiosyncrasies for 0-100% foods (M=29.6%, SD=28.8%).

Parents reported the most frequently endorsed accommodation strategies were to give their child only what she/he will easily eat and to send separate meals/snacks to events outside the home (mean accommodations used=4.6, SD=3.2; of 15 total accommodations). 10% of parents reported not using any of the possible accommodations. Both children and parents reported eating to interfere with emotional well-being, relationships, daily life activities, social experiences, and health/nutrition, at an average of a few times a week.

Psychometric evaluation of the FSI suggests evidence of criterion validity. 66 parents (76%) reported that they would describe their child as a picky eater. Picky eaters had a significantly smaller food repertoire, $F(1,85)=55.4, p<.001$ and a significantly more idiosyncrasies about foods than those described as not picky. Total food repertoire was negatively correlated with overall impact of eating on daily life ($r=-.48, p<.01$), such that eating fewer foods was associated with a greater impact of eating on daily life.

Conclusions:

The FSI offers promise as a characterization and possible outcome measure for food selectivity. Results document children’s cognitive willingness to eat foods not currently in their food repertoire, identifying a treatment entry point and potential measure of food flexibility and treatment change that is missed in food repertoire or intake measures. Individual differences and use of the full range of responses suggests that these novel variables may provide granular measurements of treatment progress. Preliminary evidence of criterion validity is a first step toward validating this new measure.

405.321 (Poster) Gaming Therapy: A Realist Evaluation

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Background:

Neurodivergent youth can experience challenges in social functioning that can adversely affect their overall well-being and health. An increasingly used form of intervention to support neurodivergent youth to develop skills is Gaming Therapy. As Gaming Therapy is an emerging intervention, its active ingredients contributing to outcomes are still ambiguous.

Objectives:

The aim of this study was to explore the contexts, mechanisms and outcomes of a Gaming Therapy program for neurodivergent youth.

Methods:

A qualitative ethnographic study guided by a realist evaluation approach was employed to determine the contexts, mechanisms, and outcomes (CMOs) of a Gaming Therapy program delivered at a disability service and support organization located in Perth, Western Australia. A realist evaluation approach is concerned with identifying what works, for whom, and under what conditions. Interviews and observations were undertaken with neurodivergent youth attending the gaming therapy (n=4) and gaming therapy facilitators (n=2). Interviews were also conducted with caregivers of neurodivergent youth attending gaming therapy (n=5).

Results:
Four context themes, three mechanisms themes, and three outcome themes were identified. Contextual factors included personal factors of the neurodivergent youth (skills, interests, and support needs), personal factors of the caregiver (their attitudes toward technology, gaming, and family goals), facilitator factors (their interests and clinical experience), and institutional factors (resources and funding). Mechanisms included activity design (therapy goals and activity choice, fun, online engagement), and environment (peer interaction, parental involvement, physical environment). Whilst outcomes found included skill development (social skills, emotion regulation), motivation (motivation to attend current and future services, confidence).

Conclusions:

The realist evaluation demonstrates the complex interaction between the contexts, mechanisms, and outcomes associated with gaming therapy. Harnessing the interests of youth in gaming therapy and allowing them to demonstrate expertise during the therapy process provided children with a safe environment through which to practice and develop their skills. Engaging in the gaming therapy motivated youth to be willing to engage in future interventions and supported them to develop their skills in communicating their needs, engaging with others, and regulating their emotions. Through the realist evaluation, this study provides a framework for the why, how, and for whom gaming therapy works.

405.322 (Poster) Gender Differences in the Wellbeing of Autistic Adolescents in Contrasting School Placements: A Cohort Study with a Control Group

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Background:

The most appropriate educational setting for a child is one in which they are fully included in the life of the school community, and which gives them a sense of belonging and achievement (Warnock & Norwich, 2010). Inclusion is important for reasons of social justice, but research from the UK’s National Autistic Society (NAS) and All-Party Parliamentary Group on Autism in 2017 reported lack of teacher understanding, low levels of happiness in autistic pupils and rising levels of school exclusions. In response, specialist resource centres (SRCs) were established in five mainstream secondary schools in Southeast England, providing specialist support and a calm space to which autistic students can retreat. The provision of this ‘zone of safety’ aims to give students a sense of control and develop their sense of school belongingness (SOSB) leading to improved academic, social and emotional outcomes. Previous research documents gender variations in mental health and wellbeing of autistic adolescents, but to date there is a scarcity of research on the impact of contrasting school placements on SOSB, mental health and social outcomes according to gender.

Objectives:

The current study explored whether autistic adolescents’ SOSB, social outcomes and mental health varied according to gender and school placement (SRC vs. non-SRC placement).

Methods:

Survey data were collected from 100 autistic pupils aged 11 – 15 (72 identifying as male; 28 identifying as female) from seven mainstream schools: five with SRCs and two without. Participants completed measures of internalising symptoms (peer problems and emotional problems) at the beginning and end of their school year. In addition, SOSB, friendship quality and victimisation were measured at the second time-point. Two-way between-groups analyses of variance were conducted to explore interactions between gender and school placement.

Results:

Regardless of placement type, girls' internalising symptoms increased more than boys’ over the course of the year, with a large effect size ($\eta^2 = 0.11$). Furthermore, there were significant gender x school placement interactions for all cross-sectional measures: While no gender differences occurred for students with SRC placements, significant differences were found in non-SRC placements, whereby girls displayed lower SOSB, lower friendship quality and higher victimization than boys when they are in non-SRC placements.

Conclusions:

While autistic girls show poorer social and mental health outcomes than boys overall, placement in a SRC may help to close the gap, improving their SOSB and social outcomes in contrast to those in non-SRC placements. These findings can be interpreted according to the theory of camouflaging in females, which explains how girls are more likely to mask autistic characteristics due to increased sensitivity to social pressure to fit in. Placement in a SRC may decrease this pressure, reducing the psychological burden. The less favourable findings for boys in SRC placements may relate to level of support needs/co-occurring conditions but may also be accounted for by a heightened
sense of stigma associated with their placement. The findings highlight a growing need to consider gender differences in school placement and have implications for inclusive practice and policy.

405.323 (Poster) How Autism Educators May Better Support Their Students’ Challenging Behaviors and Emotion Regulation: A Needs Assessment

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Background: Children on the autism spectrum often engage in behaviors, such as aggressive behaviors towards self or others, that are dangerous to the student, others, or interfere with learning and development. Autism educators are responsible for supporting their students’ educational development while addressing these challenging behaviors (CBs) and supporting students’ emotion regulation. Educators often feel ill equipped to fulfill the demands of their role, which jeopardizes students’ educational and personal success. Previous research has identified that autism educators need staff training, collaboration between educators and with parents, and physical resources. To our knowledge, no study has examined the barriers and facilitators educators and administrators face in supporting students on the autism spectrum with emotion regulation and addressing CBs.

Objectives: To elucidate the facilitators and barriers autism educators face in addressing challenging behaviors and supporting emotion regulation in students on the autism spectrum.

Methods: We conducted semi-structured interviews with 38 educators/administrators working with students on the autism spectrum in preschools or elementary schools in a large urban public school district regarding needs, barriers, and facilitators to supporting emotion regulation and addressing CBs in their students. The sample included 28 autism support teachers, 3 classroom aides, 1 special education liaison, and 6 school administrators to incorporate multiple perspectives. We utilized a modified grounded theory approach to iteratively develop a codebook and identify emergent themes across these perspectives on the needs, barriers, and facilitators expressed in these conversations.

Results: Educators expressed needs relating to increased physical resources (e.g., sensory supports for self-regulation), human resources (e.g., one-to-one instruction on calming techniques), and quality of staff training (e.g., training on identifying behavior triggers). Educators expressed barriers relating to poor school team collaboration (e.g., general education teachers stigmatizing CBs), difficulty understanding students (e.g., students’ difficulty with verbally communicating needs and stress), and inadequate resources (e.g., high staff turnover leading to inconsistent support for students). Educators expressed facilitators relating to good school team collaboration (e.g., teamwork in addressing and de-escalating CBs) and positive parental involvement (e.g., parents’ willingness to implement emotion regulation strategies at home). Administrators concurred that an important barrier to address is a lack of team communication surrounding triggers to behaviors and CBs and that facilitators include providing training/support to educators and an interdisciplinary approach to good school team collaboration. Of all responses from educators/administrators, 79% described needs, 74% described barriers, and 53% described facilitators.

Conclusions: Educators and administrators identified several barriers, but also identified potential facilitators that help minimize the impact of these barriers for particular students/instances of CB, such as good school team collaboration and positive parental involvement. They also expressed that ultimately the majority of these barriers could be addressed with investments in the identified needs such as more physical and human resources as well as higher quality staff training. This qualitative analysis provides a nuanced understanding of how school districts and preschools could empower their staff to effectively support their students’ educational, behavioral, and emotional development. Further research is needed to analyze whether these findings generalize to other school districts.

405.324 (Poster) How Is Social Validity Measured in Intervention Research on Transition-Age Autistic Youth?

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Background: We recently conducted a systematic review/evaluation of intervention research on transition-age autistic youth. Of the 193 studies in this review, 181 studies used single-case research designs (SCDs), and ~70% examined behaviorally-based interventions. Research guidance on SCDs stipulates social validity should be examined alongside intervention efficacy, to ensure the intervention is acceptable to stakeholders (Horner et al., 2005). We conducted a secondary analysis of this review, to determine how social validity was defined, assessed, and interpreted. Our motivation was two-fold. First, research quality is increasingly questioned in autism research (Sandbank et al., 2019), and this has included critiques of social validation procedures (Schwartz & Baer, 1991; Ledford et al., 2016).
Second, social validity may be particularly important to examine in intervention studies that involve autistic youth, because many of these youth have expressed dissatisfaction toward the services available to them (Bottema-Beutel et al., 2019).

Objectives: We sought to determine:

- What proportion of studies assessed social validity?
- What dimensions of social validity were assessed, including the acceptability of the goals, acceptability/feasibility of the procedures, and perceived importance of the outcome?
- What were the features of the social validation procedures, in terms of data collection methods and measures, timing of the assessment (e.g., before, during, and/or after the intervention), scoring/analysis procedures, and selection of informants?
- How were the findings of social validity assessments interpreted?

Methods: Two coders examined each study according to whether social validity was assessed, the dimensions included in the assessment, the assessment procedures, and how the results of the assessment were reported and interpreted. Inter-coder agreement ranged from 80%-100% across categories.

Results: Studies included 987 youth (809 Male, Mean age = 17 years), and 53% of studies measured social validity. Of these, 51% assessed the acceptability of the goals, 86% assessed the acceptability of the procedures, 82% assessed the perceived importance of the outcomes, and 43% assessed all three dimensions. Table 1 shows the percentage of studies that employed various social validation procedures, and Table 2 shows how assessment results were interpreted.

Conclusions: Social validation assessments are too infrequently used in intervention research on transition-age autistic youth, and when they are used the assessment procedures are often incomplete, poorly described, rely on unvalidated data collection instruments, and/or are not analyzed by robust procedures. Interpretations of social validity assessments are heavily skewed in favor of the intervention. Given the cursory nature of social validation procedures, we are unable to say whether current interventions hold promise in terms of the acceptability of the goals, the acceptability and feasibility of the procedures, and the perceived importance of the outcomes. Given that the transition period is a point at which autistic youth are expected to have more autonomy and choice in regards to the types of educational strategies they receive, it is critical that these youth are given socially valid intervention options. To be neurodiversity-affirming, autism interventions should be designed with autistic people’s input, focused on priorities they endorse, and adapted to meet individual preferences and needs.

Background: Anxiety is common for autistic people and impacts on quality of life and social participation. Autistic people may experience multiple anxiety disorders concurrently and the features/presentation of anxiety may differ from neurotypical populations. Clinical guidance recommends psychological therapies as the first-line treatment for anxiety, with some emerging evidence they can be effective with autistic people. However, for these therapies to be accessible they need to be individualised. PAT-A is an intervention comprising modular, adapted psychological treatments designed to tailor flexibly to the individual needs of autistic adults experiencing anxiety.

Objectives: To explore preliminary evidence for the utility of PAT-A in treating anxiety experienced by autistic adults.

Methods: We recruited thirty-four autistic adults with clinically significant anxiety via UK clinical services for an RCT designed to assess the feasibility and acceptability of PAT-A (feasibility and acceptability findings have been reported previously). Participants were randomised to receive PAT-A (N= 17; 65% male; mean age= 39.5) or Enhanced Services as Usual [ESAU] (N= 17; 65% male; mean age= 33.1). The median number of current anxiety disorders experienced by participants in each group was three. Participants completed several outcome measures at baseline and three months post-intervention. Key outcome measures included Target Situations Vignettes: an established procedure to assess real-life change in two pertinent anxiety-related situations (assessed by four independent, blinded researchers). The Global Clinical Impression of Improvement (CGI-I) rating scale involved a blinded independent researcher rating change across a variety of clinical outcome measures. Participants in the PAT-A group were interviewed at end of trial about their experiences of treatment: thematic analysis undertaken of verbatim responses.

Results: All participants were recruited and completed baseline measures pre-COVID-19 pandemic. In the PAT-A group, 11/16 participants completed their follow up measures during the pandemic compared with 4/14 in ESAU. Some outcome measures could not be rated due to pandemic restrictions (e.g., target situation was to eat at a restaurant but at follow up restaurants were closed). Of the target situation vignettes rated, 48% in PAT-A group were judged to have showed evidence of improvement compared with 41% of ESAU group.
Using CGI-I, 62% of rated participants in PAT-A group showed evidence of positive change vs 30% in ESAU. Thematic analysis revealed four themes: 1) transferable skills; 2) adjusted to meet the needs of autistic people; 3) positive impact of PAT-A; 4) more sessions needed. One participant (female, aged 37) reported: “I’ve had therapy since I was 17 and this was by far the best therapy I have had...it has helped me so much... I have grown so much and learned so much about myself.”

Conclusions: This flexible and modular intervention shows promise in treating anxiety in a sample of autistic adults with multiple anxiety disorders. COVID-19 impacted on both the anxiety experiences of people and the interpretability of the findings. Despite this, the evidence of feasibility and successful recruitment and delivery of both interventions support the need for a future fully powered RCT to evaluate the clinical efficacy of PAT-A in autistic adults with anxiety.

405.326 (Poster) Rubi Goes to Town: Child Outcomes and Providers' Views on Implementing an Evidence-Based, Parent-Mediated Intervention for Autism and Disruptive Behavior in the Community

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Background: The importance of disseminating and integrating high-quality, evidenced-based interventions for autistic children and their families cannot be overstated. One such intervention, designated for parents of children with autism and disturbing behaviors (DBs; e.g. noncompliance, aggression, and tantrums), is the Research Unit in Behavioral Intervention (RUBI). This is a time-limited, manualized, and parent-mediated intervention protocol, shown to be effective in one-on-one (Bearss et al., 2015) and group settings, in face-to-face or an online format (Graucher et al., 2022). As up to 50% of children with autism also present DBs, there is significant need for effective, community-delivered interventions that target such behaviors. However, up until now, the integration and implementation of RUBI in community settings has not been examined.

Objectives: The current study assesses the dissemination of RUBI program in community settings in Israel, focusing on child outcomes (i.e. reduction in DBs), and clinician perceptions of the intervention and its’ implementation process.

Methods: 17 parents of children aged 3-10, and 9 therapists, from 3 community sites participated in the current study, which is ongoing. RUBI was delivered for 12 weeks, in group and one-on-one formats, by clinicians supervised by a certified behavioral analyst. Child outcome was measured using the parent-report Aberrant Behavior Checklist (ABC). Additionally, clinicians who delivered the intervention participated in semi-structured interviews after their completion, to assess their perceptions of this intervention and its’ integration process in their respective settings.

Results: Paired sample t-tests demonstrated a significant decrease in ABC Irritability (t[16] = 2.26, p < .05), Social Withdrawal (t[16] = 2.65, p < .05) and Hyperactivity (t[16] = 2.61, p < .05) scores, from pre to post intervention. Qualitative investigation of the interviews with therapists revealed several facilitative factors in the protocol’s implementation, including the protocol’s practicality and accessibility, staff beliefs regarding the evidentiary support of the RUBI, parental attendance, commitment and collaboration, and the relationship between the research teams and the implementing staff. Barriers to successful implementation included time limitations, funding issues, and logistical challenges.

Conclusions: This study provides support for the effectiveness of RUBI when integrated in community settings and implemented by community practitioners. RUBI is an evidence-based protocol that lends itself to effective integration and implementation in community-based settings. However, barriers to successful implementation were observed by community practitioners and must be addressed. Increased longitudinal exploration of RUBI’s implementation process is necessary in order to assess the long-term feasibility, acceptability, and demand for the protocol in community settings.

405.327 (Poster) Self-Set Goals: Facilitating Self-Support for Autistic Adults.

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Background:

Most interventions for autism seek to address perceived challenges associated with autism, rather than identify what the autistic individual wants support with. Digitally-mediated social stories are a highly acceptable intervention within the autistic community, that offer the potential to empower autistic people to support themselves.

Objectives: A participatory research design was carried out to investigate the usefulness and the effectiveness of digitally-mediated social stories for autistic adults to support themselves.

Methods:
Thirty-three participants self-set goals and self-developed social stories to address these goals using a free digital application co-developed with the autistic community (SOFA-app.org). Measures of closeness to self-set goal (from 0 to 10) were collected at baseline and after two weeks of developing then reading their digital stories to themselves.

Results:

The participants reported closeness-to-goal mean ratings at baseline (M = 2.73, SD = 2.43) and after for two weeks (M = 6.94, SD = 2.62). The use of a digitally mediated social stories elicited a significant mean increase of 4.21 (SD = 2.57), 95% CI [3.30, 5.12] in closeness-to-goal ratings, 95% CA [3.30, 9.41], t(32) = 9.41, p < .001. A Cohen’s d of 1.67 is indicative of a large effect size.

The participants’ self-set goals were inductively analysed by two judges independently, with any disagreements resolved by a third judge. This analysis resulted in five categories of self-set goals: (1) decrease non-social behaviours, (2) increase non-social behaviours, (3) decrease social behaviour, (4) increase social behaviour, and (5) decrease anxiety. The interrater agreement was 97%. Cohen’s κ was also run to determine if there was agreement between the researchers’ judgement. There was a very strong agreement between judgements, κ = .944, p < .001. There was no statistically significant difference between type of self-set goal and change in closeness-to-goal ratings, F(1, 31) = 0.01, p = .99.

Twenty (n=20) of the participants also self-set a ‘Control Goal’ that was not supported by a social story. There was a statistically significant increase in closeness-to-goal ratings for the Control Goal from baseline ratings (M = 1.80, SD = 1.77) to outcome ratings after 2 weeks (M = 3.30, SD = 1.69) of 1.50 (SD = 1.00), 95% CI [1.03, 1.97], t(19) = 6.71, p < .001, d = 0.87. The mean change in closeness-to-goal for the Control Goal (M = 1.50, SD = 1.00) was lower than for the self-set goal for which a digitally-mediated social story was written (M = 4.30, SD = 2.18). There was a significant difference in mean change in closeness-to-goal ratings of 2.80, 95% CI [1.66, 3.94], t(19) = 5.13, p < .001, d = 1.65. There were no discernible differences in the attainment of self-set goals between those who did and did not set a Control Goal.

Conclusions:

The findings highlight that digitally mediated social stories can enable autistic adults to support themselves to address self-set goals they themselves want to achieve. Analysis of the participants’ self-set goals indicated that autistic adults predominantly identified a need for support with increasing non-social behaviours.

405.328 (Poster) Using Digitally-Mediated Social Stories to Improve Procedural Integrity and Support Engagement with ‘Social Humility’ in Parents of Autistic Children.

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Background:

Social stories are a support tool which are widely-used by the broader autism community. However, poor procedural integrity has resulted in a high degree of variability in outcome research. Poor procedural integrity can be addressed through a free digitally mediated social stories co-developed with the autistic community (SOFA-app.org). Recent guidelines on the development of social stories have highlighted ‘social humility’ as key for effectiveness of the intervention. Social humility involves acknowledging that lack of understanding between autistic and non-autistic people is a two-way issue. Digitally mediated social stories can increase procedural integrity, and also encourage social humility in parents, by actively engaging with their children when identifying goals in the process of developing social stories.

Objectives:

A pre-and-post quasi experimental design was carried out with 17 parents of autistic children, to investigate the effectiveness of parent-developed social stories, and to explore the impact of engaging with children in the development of stories. 8 parents identified goals with their children, and 9 parents identified goals for their children.

Methods: Stories were developed and delivered in a digital modality (SOFA-app). Autistic children accessed the stories daily for two weeks by using the digital application. Parents completed closeness to goal rating (from 0 to 10) at baseline and after two weeks. A control goal was also identified and rated, that was not addressed with a social story.

Results:
Mean baseline closeness to goal was 3.12 (SD = 1.90) and outcome closeness to goal rating after 2 weeks was 7.41 (SD = 2.09). There was a statistically significant mean increase of 4.29, 95% CI [2.90, 5.69], t(16) = 6.53, p < .001. A Cohen’s d of 1.58 indicates a large effect size.

The mean closeness to control goal rating at baseline was 2.82 (SD = 1.94) and the mean outcome closeness to goal ratings after 2 weeks was 2.88 (SD = 2.18). The mean difference of 0.59 was not statistically significant, 95% CI [-0.353, 0.471], t(16) = 0.251, p = .80.

From the 17 participants, 8 consulted with their children prior to creating a social story, and 9 did not. An independent-samples t-test was run to determine if there were differences in change in closeness to goal rating between the parents who consulted and those who did not consult with their children. The change in closeness to goal was higher for parents who consulted with their children (M = 5.88, SD = 2.23) than parents who did not consult with their children (M = 2.89, SD = 2.37). The difference, M = 2.98, is a statistically significant difference, 95% CI [0.598, 5.374], t(15) = 2.67, p = .018.

Conclusions:

The findings indicate that digitally mediated social stories are effective at supporting parents of autistic children to reach the social story goal. Furthermore, social stories that were developed together with the children were more effective. Digitally-mediated social stories, therefore, have the potential to improve procedural integrity and can enable parents to engage with social humility when developing social stories, which enhances effectiveness.

### POSTER SESSION — INTERVENTIONS - NON-PHARMACOLOGIC - SCHOOL-AGE, ADOLESCENT, ADULT

**435 - Interventions - Non-pharmacologic - School-Age, Adolescent, Adult II**

**435.233 (Poster)** Improvements in Internalizing Symptoms in Autistic Adolescents in Response to a Single Session Online Growth Mindset Intervention

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Background: Autistic youth experience elevated rates of co-occurring internalizing disorders (Rosen et al., 2018), but standard interventions are often time-intensive and costly (Buescher et al., 2014; Kazdin & Blase, 2011). The COVID-19 pandemic further exacerbated the need for brief, scalable mental health interventions due to increased mental health symptoms and barriers to care for autistic youth (Ameis et al., 2020; Colizzi et al., 2020; Manning et al., 2020; L.C. White et al., 2021; S.W. White et al., 2021). Single-session interventions (SSIs) offer a scalable solution to this challenge. Project Personality (PP), a growth-mindset SSI, has shown reliable, replicated, and robust effects on depression and anxiety symptoms in neurotypical adolescents (ds = .28-.60; Schleider et al, 2019, Schleider & Weisz, 2018; Schleider & Weisz, 2016). If beneficial for autistic youth, the scalability of SSIs makes them a prime option to reduce barriers and increase equitable access to care for underserved populations, such as those from low-income or economically marginalized (LIEM) backgrounds.

Objectives: To assess the preliminary results of a randomized control trial of an online growth-mindset SSI in autistic adolescents from across the United States.

Methods: 12 autistic adolescents (Mage = 13.9, SDage = 1.7; 83.3% male; 41.7% LIEM) with a parent-reported Autism Spectrum Disorder diagnosis and parent-reported IQ ≥ 70 were randomly assigned to a 30-minute growth-mindset SSI (PP) or active control (a structurally similar computer-based program mimicking supportive therapy; ST). All study activities were completed online. Adolescents and a caregiver completed standardized questionnaires related to depression (Children’s Depression Inventory 2; CDI-2; Kovacs, 2010), anxiety (Multidimensional Anxiety Scale for Children-2; MASC-2; March, 2012) and executive functioning (Behavior Rating Inventory of Executive Function-2; BRIEF-2; Gioia et al., 2015) before the SSI and 3 months later. ANCOVA of change analyses controlling for pre-intervention scores were run. Data collection is ongoing. To date, nine youth have completed three-month follow-up questionnaires.

Results: There were no differences across the measures between groups pre-intervention. At three-month follow-up, the PP group self-reported greater decreases in CDI-2 Total (B = -5.1, p < .03) and MASC-2 Tense/Restless (B = -16.9, p < .02) t-scores than the ST group. Additionally, caregivers of PP adolescents reported greater decreases in MASC-2 Tense/Restless (B = -8.1, p < .01), Separation Anxiety/Phobias (B = -7.8, p < .02), Generalized Anxiety (B = -13.3, p < .05), and Social Anxiety (B = -11.8, p < .02) and BRIEF-2 Shift (B = -10.3, p < .001) and Emotional Control (B = -6.5, p < .026) subscale t-scores than those randomized to ST.
Conclusions: Decreases in anxiety and depression symptoms were reported by autistic adolescents and their caregivers three months after participation in a brief online growth-mindset SSI. Caregivers also reported decreased inflexibility and emotion regulation challenges. These results suggest that Project Personality may be a promising, time- and cost-effective intervention for addressing internalizing symptoms in autistic youth, particularly for those from LIEM backgrounds who face increased challenges accessing traditional services. Future research should continue to evaluate the efficacy of SSIs and for which individuals these interventions are most beneficial.

435.234 (Poster) Improving Psychosocial Adaptation in Adults with Autism Spectrum Disorder through an Intervention Program Focused on Executive Functioning

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Background: Individuals with autism spectrum disorder (ASD) experience difficulties with executive functioning (EF), which is often correlated with adaptive skills and is used in various daily activities throughout one's lifespan.

Objectives: The purpose of this study is to conduct a randomized controlled trial to investigate the changes in psychosocial adaptation of high-functioning adults with ASD (HFASD) by participating in an intervention program targeting to enhance EF skills.

Methods: The program, which aims to improve everyday EF and adaptive behavior, consists of sessions covering topics related to EF skills (i.e., organization, planning, time management, emotional regulation, and cognitive flexibility), and sessions that promote the application of EF skills in daily living activities (i.e., financial management, adaptation to new environments, and job searching). Thirty adults with HFASD were randomly assigned to either the active treatment or waitlist control group. Various questionnaires, such as the Personal Growth Initiative Scale-II (PGIS-II), Self-Efficacy Scale (SES), and the Career Decision Making Self-Efficacy Short Form (CDMSE-SF), were used to measure self-efficacy. We performed linear mixed-effect modeling to demonstrate the effectiveness of the program.

Results: Significant group x time interaction effects based on the linear mixed effect model were found in the PGIS-II planning ability ($F=4.59$, $p<.05$), CDMSE-SF total score ($F=4.76$, $p<.05$), and self-appraisal ($F=4.4$, $p<.05$) (Figure 1). Assessments of the intervention effects for the treatment group after the three-month follow-up showed significant changes across time (pre-, post-, and follow-up) in the PGIS total score ($F=5.52$, $p<.05$), readiness for change ($F=3.96$, $p<.05$), planning ($F=7.16$, $p<.01$), SES total score ($F=4.57$, $p<.05$), general self-efficacy ($F=4.3$, $p<.05$), CDMSE-SF total score ($F=5.52$, $p<.05$), and planning ($F=9.86$, $p<.01$) (Figure 2).

Conclusions: As the first evidence-based intervention for adults with HFASD in Korea to enhance EF skills, the program also demonstrated improvements in personal growth initiative and self-efficacy. Our findings suggest that psychosocial adaptation and independence can be improved in individuals with HFASD during their transitional period from adolescence to adulthood.


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Background: Autistic children are at high risk of experiencing social exclusion, including in community programs. Educational interventions aimed at increasing peers' understanding of autism might support their social inclusion.

Objectives: To explore the benefits of a brief, individualized, peer-directed autism education intervention on peer engagement and inclusion of autistic children at day camp.

Methods: A convergent, parallel, two-arm (intervention/no intervention), non-randomized, mixed-methods design was used. The 5-10 minutes, peer-directed, educational intervention, included four components: (1) diagnostic label, (2) description and purpose of unique behaviors, (3) favorite activities and interests, and (4) strategies to engage them. Each individualized intervention script was co-constructed by the autistic camper (if able), their parent and a researcher, then delivered by the researcher. Videos (10-15 minutes) were taken on days 1, 2 and 5 of each camp during consistent activities within each camp. In the intervention group, the education intervention was conducted after the first video. A timed-interval behavior-coding system was used to evaluate engagement between each autistic camper and their peers (% intervals jointly engaged/not jointly engaged). Change scores across days were calculated within each group, and Eta-squared
Internet-Delivered Acceptance and Commitment Therapy for Parents of Children with Disabilities (I-Navigator ACT): An Open Feasibility Study

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Background: Parents of children with autism and other disabilities are more likely to experience stress, distress and lower satisfaction in their parental role compared to parents of typically developing children. Known risk factors include child behavioral problems, lack of community support, high parental care burden, and social stigma. Despite an abundance of research, there is still a lack of evidence-based interventions that cater to these parents’ needs. In response to this, we have developed a manualized Acceptance and Commitment Therapy group intervention (Navigator ACT) that has so far been assessed in an open feasibility study (n = 94) with promising results. To facilitate wider access to the Navigator ACT program without geographic restrictions, we have developed an individual internet-delivered version of the treatment: I-Navigator ACT.

Objectives: The current study aims to evaluate the feasibility of the internet-delivered I-Navigator ACT treatment when it comes to improving parental well-being and reducing stress and distress.

Methods: We conducted a mixed methods open feasibility trial within an outpatient habilitation services context in Stockholm, Sweden. We enrolled n = 34 parents of children with disabilities to participate in the internet-delivered Navigator ACT program. The program consisted of 10 modules with weekly written support from a coach. Feasibility was measured regarding treatment completion, parental satisfaction, treatment credibility and preliminary outcomes using self-rated psychometric questionnaires administered at baseline, post-intervention, and 3-month follow-up. As part of our mixed methods approach, we also conducted interviews with 9 participants post-intervention.

Results: Thus far, we have analyzed participant baseline data as well as overall satisfaction with the treatment program. Of the 34 parents who enrolled, 24 completed the intervention (71%). The participants rated their satisfaction 4.2 (averaged over all 10 modules) on a 5-point Likert scale, which suggests that the participants were satisfied with the treatment program. In the qualitative post-intervention interviews the participants indicated that the treatment program was helpful, especially with weekly support from the I-Navigator ACT coach. The participants also provided several suggestions for treatment improvements and revisions.

Conclusions: While all results have not yet been fully evaluated, the preliminary results regarding treatment satisfaction are promising. By offering the Navigator ACT intervention as an individual internet-delivered treatment, we anticipate that we can provide parents of children with disabilities a safe, readily available, and efficacious form of treatment for parental stress and distress. To fully evaluate effectiveness of I-Navigator ACT compared to the group-based Navigator ACT, randomized controlled trials are needed.

Intervention Use and Effectiveness in Families with Autistic Children with Eating and Drinking Difficulties

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Background: The current study aims to evaluate the feasibility of the internet-delivered I-Navigator ACT treatment when it comes to improving parental well-being and reducing stress and distress.

Methods: We conducted a mixed methods open feasibility trial within an outpatient habilitation services context in Stockholm, Sweden. We enrolled n = 34 parents of children with disabilities to participate in the internet-delivered Navigator ACT program. The program consisted of 10 modules with weekly written support from a coach. Feasibility was measured regarding treatment completion, parental satisfaction, treatment credibility and preliminary outcomes using self-rated psychometric questionnaires administered at baseline, post-intervention, and 3-month follow-up. As part of our mixed methods approach, we also conducted interviews with 9 participants post-intervention.

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Conclusions: While all results have not yet been fully evaluated, the preliminary results regarding treatment satisfaction are promising. By offering the Navigator ACT intervention as an individual internet-delivered treatment, we anticipate that we can provide parents of children with disabilities a safe, readily available, and efficacious form of treatment for parental stress and distress. To fully evaluate effectiveness of I-Navigator ACT compared to the group-based Navigator ACT, randomized controlled trials are needed.
Background: The FEEDS (Focus on Early Eating, Drinking and Swallowing) Toolkit is a clinical and evidence-based resource that explains the reasons for eating, drinking and swallowing difficulties (EDSD) in children with neurodisability, and provides a decision aid for choosing among interventions that can be used to improve feeding. It is being developed following the National Institute for Health and Care Research (NIHR) funded FEEDS review, which included a UK national survey of parents’ use of home-based interventions. This study analysed responses from the parents of autistic children.

Objectives: To understand which interventions are used by families of autistic children with EDSD and their perceived effectiveness.

Methods: Questionnaires for parents of children with neurodisability and EDSD were distributed through UK parent networks and mainstream and specialist schools. The content of the survey was determined by previous stages of the FEEDS review, including systematic reviews of interventions, a mapping review, and focus groups involving parents and healthcare professionals with experience of EDSD. 359 parents of children with EDSD participated. Parents of autistic children formed the largest proportion of responses (n=183). Answers regarding the use of an intervention and the parent’s opinion on their effectiveness were analysed.

Results: On average, parents of autistic children with EDSD in the UK have tried 6.25 interventions (SD= 4.05) to improve their child’s feeding. Interventions most commonly tried by families of autistic children with EDSD include being aware of the impact of sensory difficulties on eating/drinking (58%), use of visual supports (58%), desensitisation programmes for food avoidance (55%), enhancing child/feeder communication (53%) and changing behaviour at mealtimes (52%). However, the most used interventions were often not perceived to be the most effective, with effectiveness rates of 49% (for being aware of the impact of sensory difficulties on eating/drinking), 41% (for visual supports) and 32% (for desensitisation programmes for food avoidance). The interventions that were most commonly perceived to work amongst autistic children with EDSD include hand over hand prompting (used by 32%, viewed as effective by 62%), sensory aids (used by 13%, viewed as effective by 59%) and modification to environment at mealtimes (used by 51%, viewed as effective by 58%).

Conclusions: Families of autistic children with EDSD try a number of interventions to improve feeding, with variable success. A cumulative approach to EDSD intervention use, first utilising the interventions most often tried and those with the highest effectiveness rate in autistic children, and then trying less common or less successful interventions, may be beneficial for this cohort. The FEEDS Toolkit will utilise these findings and encourage an individualised approach to the management of EDSD by providing families with accessible information regarding the different interventions available, how they are implemented, how to evaluate their effectiveness and a recommended duration to trial the intervention.

435.238 (Poster) Interventions for Autistic Adults and Their Close Relations in an Outpatient Stepped Care Model

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Background: In stepped care models, psychoeducative first-line interventions are provided soon after confirmed autism diagnosis to include most autistic adults presenting in an outpatient habilitation context. Family members/close relations are included in the first-line interventions, if desirable and acceptable for the autistic adult. More demanding skills training interventions follow later in the care process based on each individual’s needs. An example of a second step intervention would be a stress reduction intervention addressing the frequently reported high stress and impaired ability to cope with stressors among autistic adults.

Objectives: To evaluate feasibility (acceptability and intervention completion) of (1) Prisma, a new first-line intervention for autistic adults and their close relations, and (2) Mindfulness-based stress reduction (MBSR) groups targeting individual’s internal resources to regulate stress responses, in an outpatient context.

Methods: Prisma was evaluated in an open feasibility study including 92 intellectually able autistic adults and their 94 close relations. The MBSR groups were also evaluated in an open feasibility study recruiting 50 intellectually able autistic adults. Both studies thus included several intervention groups provided by outpatient services. The interventions were guided by trained group leaders, and followed a manualized protocols including adaptations to autistic adults’ needs.

Results: Completion rate in Prisma was 77% for autistic adults and 73% for close relations. The participants reported good acceptability; however, the qualitative analysis indicated that Prisma could be improved by enhancing active participation. Preliminary effectiveness analyses indicated increase in autism knowledge and some improvements in relationship quality, mental health, quality of life, acceptance of diagnosis and burden of care. In the MBSR study, n=43 (86%) attended at least one session and n=34 of these (79%) completed the intervention. Participants found MBSR logical, likely to lead to improvement and recommendable to autistic peers. Measures of preliminary effectiveness indicated reduced symptoms of stress (p < 0.001; d = 0.51) and improved stress-coping skills (p = 0.017; d = 0.43) from pre- to post- intervention, as well as a reduction in anxiety symptoms and depression. No changes were observed in mindful attention awareness, life satisfaction or acceptance of the autism diagnosis.
Conclusions: Overall, results indicate that both interventions are feasible and acceptable in outpatient services. The participant feedback has been used to further improve the interventions for on-going randomized controlled trials.

435.239 (Poster) Investigating the Utility of Teaching Autism Acceptance and Neurodiversity in the College Classroom: An Exploratory Study
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Background: There is an increasing number of autistic college students. Autism stigma has significant and lifelong negative health and educational consequences for autistic individuals during and post-college. In contrast, autism acceptance and alignment with the neurodiversity movement in interpersonal, educational, healthcare, and other contexts has positive impacts on their quality of life. The college environment represents a potential opportunity to address autism stigma and, in turn, prevent the negative health consequences of stigma as autistic college students transition into adulthood.

Objectives: The purpose of the current study was to investigate the general college student body and: 1) describe their level of autism acceptance based on the neurodiversity framework utilizing the Autism Attitude Acceptance Scale (AAAS); and 2) qualitatively capture their open-ended questions surrounding neurodiversity.

Methods: The sample (n = 49, M age = 21.93, SD = 21.14) featured undergraduates enrolled in a large, diverse, public university in the U.S. The sample was diverse with respect to race (White: 45%, Asian: 25%, Black / African American: 8%, Native American / Alaska Native: 4%, Other: 18%) and ethnicity (Hispanic: 31%). Approximately 39% (n = 19) identified as neurodivergent, with 2 identifying as autistic. Students completed the AAAS—administered via Qualtrics—in February of 2022. The AAAS elicits cognitive, behavioral, and affective beliefs about accepting and accommodating autistic individuals without trying to change them, based on the neurodiversity framework. In the AAAS, participants responded to statements in relation to a hypothetical vignette about “Andy,” who is autistic. In addition, students were provided the opportunity to ask up to three questions each about neurodiversity within the same Qualtrics survey. We utilized qualitative thematic coding to extract themes from the neurodiversity questions.

Results: We derived frequency and descriptive statistics for each item and the total AAAS score (Cronbach’s Alpha =0.801). The majority of participants’ responses reflected high self-reported autism acceptance. For example, 90% or more endorsed statements such as “people need to learn more about autism to support individuals with autism better” and “autism is a unique way of being that should be appreciated.” Responses demonstrated greater variability, however, with respect to statements about curing or normalizing autistic individuals, with almost 30% and 45% endorsing the statements, “eliminating individuals' autistic symptoms can support a better quality of life for them” and “it is important for an individual with autism to get interventions about how to pick up on social cues to make friends,” respectively. Qualitative findings derived from students’ questions about neurodiversity revealed both a high degree of interest in the neurodiversity movement, as well as high variability in knowledge and familiarity with its tenets.

Conclusions: The current study represents one of the few studies to investigate autism acceptance based on the neurodiversity framework among the general college student body. In this research, a focus on undergraduate students facilitates the translation of findings to the development of strategies for cultivating an understanding of autism and neurodiversity in higher education. Such strategies have the potential to address and prevent stigma towards neurodivergent individuals into adulthood.

435.240 (Poster) Measuring Effectiveness of a Family-Centered Treatment Program on Autistic Latinx Children’s Mental Health

Background:

Parents and caregivers of Latinx children with autism spectrum disorder (ASD) report receiving less services and having more unmet needs than those of white children (Angell, et al. 2018). Additionally, Latinx parents have less access to information about ASD and have a general lack of knowledge, compared to white counterparts (Angell, et al. 2018). Issues often are compounded by a language barrier and lack of culturally sensitive services. These problems were compounded with the COVID-19 pandemic which exacerbated the issues of current programs along with increasing the mental health crisis. Implementing family-centered, caregiver-mediated programs may help bridge this gap. The Functional Natural Curriculum (FNC), developed by the Centro Ann Sullivan del Peru (CASP) is one of these programs that focuses on providing caregivers with the necessary tools to teach their children essential skills to promote independence, facilitate academic learning, and enable inclusion in all aspects of life.

Objectives:
This study aimed to assess the effectiveness of the CASP online curriculum on child outcomes, in particular on their mental health and adaptive functioning.

Methods:

Thirty-one children with ASD between the ages of 3 and 15 were enrolled in the study across two phases. Only participants that completed the study are included in the analysis of outcome measures (intervention n=13, Mage=9.7 years, 4 females; control n=7, Mage= 11.7 years, 3 females). The 16-week, virtual intervention consists of different sessions in which caregivers attend 3-5 hours of weekly sessions through individual training between caregiver-child dyads, small group parent sessions, large group parent classes, and optional extracurricular activities for the family. Outcome measures were collected electronically at baseline, week 8, and week 16 to assess mental health and at baseline and 16 weeks adaptive outcomes. Child outcomes were measured with the Aberrant Behavior Checklist (ABC), the Vinelands Behavior Scales- Third Edition (Vineland 3), the Caregiver Strain Questionnaire (CGSQ), the Family Empowerment Scale (FES), and the Family Quality of Life Scale (FQOL).

Results:

Relative to waitlist controls, children whose families participated in the intervention showed significantly greater decline, from Baseline to Week 16, in irritability (t=-2.77, p=0.006), hyperactivity (t=-2.15, p=0.02, and lethargy/social withdrawal (t=-2.04, p=0.03) on the ABC. On the CBCL there were also score improvements that were significantly larger for the intervention group on internalizing (t=-1.92, p=0.03), externalizing (t=-2.16, p=0.02) and total (t=-1.79, p=0.04). Regarding adaptive behavior, the difference in improvement between intervention in controls approached statistically significant, with large effect size, for the Adaptive Behavior Composite (t=1.78, p=0.053; Cohen’s d=0.83) and with personal skills significantly improving for the intervention group (t= -2.7888, p=.05).

Conclusions:

These results indicate that the that the CASP family-centered, online intervention program may improve outcomes for Latinx children with ASD based on the ABC, CBCL, and Vineland measures. These results indicate a potentially effective program for underserved populations in which accessing and providing care is more complex. Focusing on increasing parent-caregiver knowledge about ASD as well by giving them the tools to help their children directly may be particularly effective in this population.

435.241 (Poster) Mental Health Challenges and Emotion Dysregulation: In-Person Vs. Online Cognitive Behaviour Therapy for Autistic Youth
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Background: Previous research has shown that mental health challenges are more common among autistic children and youth (Arim et al., 2015). These challenges are often accompanied by emotion regulation difficulties, which impact a child’s ability to effectively monitor and modulate their emotional reactions (Mazebsky & White, 2014). Cognitive behaviour therapy (CBT) is an effective way to mitigate these challenges. The COVID-19 pandemic has led to a rapid shift to the online delivery of CBT, however there is limited research examining whether this adapted format is helpful and the predictors of change.

Objectives: To evaluate the benefits of a CBT program in addressing emotion dysregulation in autistic children when delivered in an online or an in-person format.

Methods: Sixty autistic children and youth (8-13 years old) without intellectual disability engaged in an adapted, manualized CBT program (Secret Agent Society: Operation Regulation [SASOR]; Beaumont, 2013) for emotion regulation difficulties. The program was delivered individually over 10 weekly sessions, either as an in-person (SASOR; n = 42) or online intervention (VSAS; n = 18). Parents completed several measures assessing their child’s emotion regulation, health-related quality of life (HRQoL), and mental health symptoms. Pre-to post-program changes were compared between the two groups (SASOR, VSAS) using mixed ANOVAs and Pearson’s correlations were used to examine associations among demographic (i.e., age, gender) variables, pre-program scores, and changes (i.e., pre- minus post-scores).

Results: Main effects for time indicated that both VSAS and SASOR youth experienced pre- to post-program improvements in emotion regulation (p < .001), externalizing (p = .009), internalizing (p < .001), adaptive skills (p < .001), behaviour symptoms (p < .001), and the HRQoL psychological wellbeing scale (p = .008). There was an interaction of group and time for the HRQoL scale of parent relations and autonomy (p = .008); simple main effects comparisons indicated only the SASOR group exhibited pre to post improvements (p < .001). For the in-person group, greater internalizing (r = .44, p = .004) and fewer adaptive skills (r = .34, p = .03) pre-intervention were related to greater improvements in each outcome at post. Additionally, younger participants demonstrated greater pre-to-post improvements on HRQoL parent relations and autonomy scores (r = .31, p = .048). For the VSAS group, lower HRQoL psychological wellbeing (r = .52, p = .03) and parent relations and autonomy pre-intervention scores (r = .66, p = .003) were related to greater improvements post-intervention.
Conclusions: Overall, the modality of treatment was not related to parent-reported changes in emotion regulation or mental health symptoms pre- to post-program, with the exception of the in-person group showing improvements in relationships with their parent and autonomy. For both modalities, more severe challenges prior to intervention were associated with greater improvements thereafter, though the specific associations varied between groups. This research provides support for the use of CBT with autistic youth, and suggests that adapted, online therapy may be a suitable intervention to address emotion regulation difficulties of some children. Further research using randomized trials and larger samples is recommended.

435.242 (Poster) Mental Health Therapist and Caregiver Perspectives on Improving Community Mental Health Services for Autistic Youth: A Focus on Executive Functioning

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Background: Publicly-funded mental health (MH) services play a significant role in caring for autistic youth given the high rates of co-occurring MH conditions common among these youth. Executive functioning (EF) deficits play an integral role in both autism and co-occurring MH conditions, including predicting increased MH symptoms. Our prior work highlights the impact of EF on MH services, including on psychotherapy engagement and progress. Research examining multi-stakeholder (therapist and caregiver) perspectives on the impact of and the need for EF and EF tools, including evidence-based interventions (EBIs), within the context of children’s MH for autistic youth is limited. Such perspectives are key to informing efforts to improve children’s MH services for autism.

Objectives: The current mixed-methods study aims to: 1) expand our prior work with MH therapists to examine caregiver perspectives regarding the role and impact of EF in MH services for autistic youth and 2) examine therapist and caregiver perspectives of key implementation outcomes (e.g., adoption, acceptability, feasibility) of Unstuck and On Target, an EF EBI, specifically adapted for use in children’s MH services.

Methods: Data were drawn from two aims of a multiphase study aimed to conduct a needs assessment to inform the adaptation and testing of Unstuck and On Target in publicly-funded MH services. We conducted an initial needs assessment examining the perspectives of therapists (n_quarter=35, 83% female, 44% Marriage and Family Therapists; n_quarter=14, 100% female, 21% Marriage and Family Therapists) and caregivers of autistic youth (n_quarter=35, 82% female; n_quarter=17, 83% female) regarding the relevance and impact of EF and need for EF-specific tools in MH services via a web-based survey and corresponding qualitative data collection. We subsequently examined therapist (N=13, 85% female, 46% Marriage and Family Therapists) and caregiver (N=8, 100% female) perspectives of the acceptability, feasibility, and utility of Unstuck via web-based survey and corresponding qualitative interview following participation in a randomized feasibility trial of an adapted version of Unstuck for autistic youth in MH services.

Results: Needs assessment findings indicate moderate knowledge and experience with behaviors consistent with EF challenges but more limited knowledge and experience with EF in autism and EF EBIs, particularly among MH therapists. Caregivers and providers agree that youth and families would benefit from EF EBIs. Subsequent feasibility trial findings indicate high adoption, acceptability, feasibility and appropriateness of Unstuck, but more limited adoption of the corresponding parent manual. Corresponding qualitative data also supported the feasibility, acceptability, and utility of the Unstuck and On Target in MH settings. See Tables 1 and 2 for full results.

Conclusions: Needs assessments indicate community support for the potential of EF interventions for MH settings. Validating these findings, subsequent trial results indicate the acceptability, feasibility, and appropriateness of Unstuck and On Target in MH settings. Overall, findings highlight the importance of gaining community perspectives to improve MH services and underscore the need and acceptability of EF-specific tools such as Unstuck and On Target within community MH services. Findings have implications for the importance of these tools for ongoing efforts to improve MH services for autistic youth.

435.243 (Poster) Moderators of Treatment Outcome in a RCT of Parent Training for Dental Care in Families of Children with ASD

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Background: Dental care is a significant unmet health need for individuals with ASD. In a randomized controlled trial, we established the efficacy of parent training (PT) compared to a psychoeducational Tool Kit (Control) for improving oral health and hygiene behaviors in 119 Medicaid-eligible children with ASD aged 3 to 13 years recruited from AIR-P sites. To better understand these results and to provide additional context regarding for whom the treatment works best, we examined possible moderating child characteristics. Based upon past literature (e.g., Farmer et al., 2012; Lecavalier et al., 2017), we anticipated that PT would be equally effective for participants across a
range of factors, with the exception of children presenting with greater initial behavior problems, for whom we expected stronger PT effects.

Objectives: To examine child characteristics as moderators of treatment response, including age, ethnicity, cognitive level (SB5-ABIQ), Autism Diagnostic Observation Schedule-2 (ADOS-2) comparison score, psychotropic medication status (yes/no), and parent-reported CBCL symptoms of inattention, aggression, anxiety/depression, and general behavioral noncompliance (HSQ-PDD).

Methods: Nine child variables were assessed as possible moderators on three outcome variables: parent-reported frequency of past-week twice-daily tooth brushing; parent-reported behavior problems during home dental care; and dentist-rated visual plaque. Parent-reported child gender was included as a control variable. Linear mixed effects models with random intercepts were used with potential moderators included as three-way interactions with Treatment Group and Timepoint (baseline, 3 months, 6 months). All moderators were included simultaneously.

Results: Despite randomization, baseline differences unexpectedly existed between PT and Control, with PT having a higher proportion of female primary caregivers and less frequent daily tooth brushing. Ethnicity was a significant moderating effect of treatment outcome with participants identifying as Hispanic/Latino showing the most improvement in PT vs. Control conditions in both frequency of tooth brushing and behavior during home dental care. PT also produced a larger reduction in behavior problems during home dental care relative to the Control at lower levels of IQ and lower ADOS-2 scores. However, differences in baseline levels of daily tooth brushing may have been confounded with moderator variables. PT-dependent improvements in twice-daily tooth brushing held across levels of aggression, but Control children with greater aggression displayed poorer dental hygiene over time. Moderators of visual plaque included ASD symptoms, inattention, and aggressive symptoms, with inconsistent patterns of differences.

Conclusions: Somewhat contrary to hypotheses, significant moderation effects were found for certain variables. Findings suggest that children who identify as Hispanic/Latino, have lower IQs, milder ASD symptoms, or more aggression may be especially likely to benefit from directed PT for dental care. In contrast, the Tool Kit may be sufficient to improve oral hygiene and dental health in other cases, particularly for children with higher IQs. The considerable ethnic, socioeconomic, and cognitive diversity of our sample is unusual for RCTs involving children with ASD, and may have increased our ability to detect moderation effects, which underscores the importance of diversifying samples in efforts to develop personalized interventions.

435.244 (Poster) Multi-Sensory Wayfinding: Lessons from the Margins Towards the Design of Equitable and Healthy Public Spaces

Background: MIXdesign investigates how the built environment may enable spatial orientation, agency, and a sense of security in public spaces through the study of the autistic, individuals requiring assisted mobility, and the deaf. Space planning principles begin where buildings meet their surroundings. They emerge from an ongoing exploration of a prototypical public entry sequence within institutional buildings with deliberate focus on optimizing spatial orientation and environmental stimulation for the three distinct but intersecting end-user populations with unexpected commonalities. This promotes the authentic exploration of the autistic, physically disabled, and deaf experiences within discrete elements of buildings as essential to problem-solving accessibility and usability.

Objectives: To design feasible and scalable buildings deliberately imagined to support greater successful interaction among and usability of space by more users within a residential college at a university as an exemplar case.

Methods: Investigators completed a comparative analysis of three end-user community perspectives to uncover affinities and differences between autistic, physically disabled, and deaf individuals. The results informed design strategies to meet the majority of needs of the three end-user groups and be relevant to the general public.

Results:

Identified barriers to accessible and usable spaces center on acoustics, lighting, wayfinding, signage, cavernous spaces without clear definition, unpredictable paths, and crowds. The outcome of our study yielded a set of design principles called Multi-Sensory Wayfinding illustrated for the entry sequence for a residential college at an American University. Multi-Sensory Wayfinding augments conventional signage and uses color, materials, lighting, and acoustics to differentiate two kinds of legible activity zones: Barrier Free Circulation Paths and Multi-Sensory Microclimates as a means to balance social distancing and human connectivity while minimizing environmental stressors and increasing spatial awareness for everyone. A discrete example: a central planter and separate entry/exit circulation aisles prevent unwanted collisions in the vestibule. This transition threshold, a concept found in the ASPECTS Design Index to support autistic sensory adjustment, demarcates the intersection where circulation paths cross to allow occupants of all abilities to slow down, acclimate to changes in direction, and adjust their senses to recalibrate between indoors and outdoors, two very different environments with different levels of stimulation. We also applied Multi-sensory Wayfinding to the area adjacent to reception, the study lounge, illustrated figure 1. It is subdivided into barrier free circulation zones and micro-climates. The Barrier Free Zone features a color-contrast floor with a detectable edge for cane users and provides a wide differentiated circulation path for pairs of people and wheelchairs to pass. The Calm
Zone features semi-enclosed nooks for small-group conversations with adjustable low-level lighting that reduces unwanted stimulation (a frequent comfort for autistic individuals as well as many others) and high back seating as a visually calm background for viewing American Sign Language.

Conclusions: Identifying elements of structures allows us to leverage the potential of place-based and population-level interventions in support of inclusion. This complements and reinforces the individual level adjustments and accommodations that have proven helpful for autistics but incompletely effective.

435.245 (Poster) Music Therapy for Autistic People: Update of a Cochrane Review
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Background: Music therapy (MT) uses music experiences and the relationships developed to enable communication and expression, thus attempting to address some of the core problems of autistic people. The application of MT requires specialised academic and clinical training to tailor the intervention to the specific needs of the individual.

Objectives: To update a review on the effects of MT, or MT plus standard care, for autistic people, and evaluate potential predictors of response.

Methods: In August 2021, we searched 14 databases and two trials registers; an update search was conducted in October 2022. Trials comparing MT (or MT alongside standard care) to 'placebo' therapy, no treatment, or standard care for people with a diagnosis of autism spectrum disorder were considered for inclusion. Results were synthesised in meta-analyses. For studies where individual participant data (IPD) of relevant outcomes and potential moderators (age, sex, severity) were available, we conducted meta-regression analyses to identify predictors of effects.

Results: We included 26 studies (1165 participants) examining the short- and medium-term effect of MT for autistic people. No new studies were identified in the update search. IPD were available from three large studies (448 participants). Twenty-one studies included children aged from two to 12 years. Five studies included children and adolescents, and/or young adults. Severity levels, language skills, and cognition were widely variable across studies. Measured immediately post-intervention, MT compared with placebo therapy or standard care was more likely to positively affect global improvement (RR 1.22, 95% CI 1.06 to 1.40) and to slightly increase quality of life (SMD 0.28, 95% CI 0.06 to 0.49). In addition, MT probably results in a large reduction in total autism symptom severity (SMD −0.83, 95% CI −1.41 to −0.24). No clear evidence of a difference between MT and comparison groups at immediately post-intervention was found for social interaction (SMD 0.26, 95% CI −0.05 to 0.57); non-verbal communication (SMD 0.26, 95% CI −0.03 to 0.55); and verbal communication (SMD 0.30, 95% CI −0.18 to 0.78). Two studies investigated adverse events with one reporting no adverse events; the other study found no difference between MT and standard care. Results of meta-regression analyses will be presented at the conference.

Conclusions: The studies included in the present review increased the certainty and applicability of the findings compared with earlier versions of this review through larger sample sizes, extended age groups, longer periods of intervention and follow-up, and by predominantly using validated scales measuring generalised behaviour (i.e. behaviour outside of the therapy context). Meta-regression results will provide much-needed knowledge on who benefits most from which type of therapy. This new evidence is important for autistic individuals and their families as well as for policymakers, service providers and clinicians, to help in decisions around the types and amount of intervention that should be provided and in the planning of resources. More research using rigorous designs, relevant outcome measures, and longer-term follow-up periods is needed to corroborate these findings and to examine whether the effects of MT are enduring.

435.246 (Poster) Examining the Effects of Online Mathematics Instruction Using Video Modeling and Other Supports in Teaching Autistic Secondary School Students
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Background: In the last few years, there has been an increase in the use of online platforms to support the learning of autistic children both due to pandemic and growing research in online learning to support autistic learners. For online learning to be effective, studies need to examine the use of instruction via technology supports to effectively engage students.
**Objectives:** The purpose of this study was to empirically evaluate the effects of synchronous, virtual instruction using video-based intervention, virtual mathematical games and manipulative, and guided supports on mathematics learning of lower-secondary autistic students.

**Methods:** This study used a multiple probe across three skills design with each participant (2 participants) of a single-case experimental methodology. Prior to selecting target skills and intervention techniques, researchers collaborated both with children and their caregivers to discuss children’s learning needs and strengths both from children’s and caregivers’ perspectives. Using participant perspectives, we selected skills and designed the intervention accordingly. Following a baseline assessment with stable trend, each student used a variety of instructional supports (video modeling, mathematical games, and virtual manipulatives along with instructor guided supports) to learn a variety of mathematics skills. We also examined skill maintenance following the completion of the study. At the end of the study, we examined social validity of the study goals, skills, and procedures both from the children’s and caregivers’ perspectives.

**Results:** Both participants demonstrated mastery (100% accuracy) for different mathematics skills, with continued demonstration of 100% accuracy during maintenance assessment. Social validity assessment results from participants and their parents revealed that participants and parents found the skills, interventions, study procedures, and learning outcomes meaningful and useful.

**Conclusions:** The findings of this study contribute to emerging research on best practices to teach autistic students in an online platform to supplement in-person learning. The results offer insight into ways to develop and implement video-based interventions, engage in hands-on exploration of online mathematics games to support learning, and virtual manipulatives to teach mathematics skills to autistic children with autism during virtual instruction. Furthermore, the findings will provide insights on how to effectively work with parents and enable them as active partners in the support of their child’s learning during virtual instruction.

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435.247  *(Poster)* On Strike: The Impact of Labor Disruptions on Autistic Postsecondary Students and How We Can Help

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Background: Labor strikes on postsecondary campuses can negatively impact students’ well-being. However, research to date has focused solely on the impact on non-autistic students. Autistic students may be differentially impacted by a strike due to core features of autism. In addition, autistic students have lower rates of successful graduation from postsecondary institutions compared to the general population.

**Objectives:** It is therefore important to better understand autistic students’ experience and needs in order to inform interventions and institutional policy to support students during such academic disruptions.

**Methods:** Twelve autistic students participated in semi-structured interviews exploring their experiences during a strike at a North American postsecondary institution. Interviews were transcribed and a thematic analysis was conducted to identify themes related to the students’ experience during the strike.

**Results:** Eight themes and three subthemes were identified and categorized in broad domains of 1) engagement in the strike, 2) consequences of the strike on everyday activities, stress, and mental health, and 3) coping with the strike. Although students differed in their level of engagement with the strike, common reactions were feelings of confusion related to strike information. Nevertheless, students felt that the strike was justified and it did not affect their level of satisfaction with their programs of study. In terms of the consequences of the strike, students expressed an increased sense of isolation and stress, as well as mood symptoms that negatively impacted daily functioning. Three main areas of coping were identified, including utilizing mental health and mentorship services, family support, and using academic accommodations.

**Conclusions:** The current study revealed important themes related to the experience of autistic postsecondary students during a strike. Through York University’s Autism Mentorship Program, we have been able to offer autistic students support that targeted identified many of these areas, including optimizing social connection, providing stress-management techniques, bolstering overall well-being, and accessing academic accommodations and other resources. We will discuss our Autism Mentorship Program’s response and will highlight the program’s scalability and adaptability to other academic settings. Lastly, seven recommendations will be provided for postsecondary institutions to consider in the event of a strike to better support the success and well-being of autistic students.

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435.248  *(Poster)* One-Size-Fits-One: Empowering Caregivers of Autistic Young Adults to Design Everyday Solutions

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**Background:**
Assistive technologies are increasingly being designed to support people with autism in everyday life. However, the actual uptake in care practices of such technologies seems to be limited. We see several possible causes. On the one hand, it may be because technologies often focus on 'functional limitations', with less attention given to the overall experience people have with the technology and the environment in which it is used. On the other hand, this may be because autistic people and their caregivers have limited or no involvement in the development of technologies. Moreover, the relationship between the autistic person and caregiver and the role technology plays between them is often completely overlooked.

Objectives:

The aim is to provide caregivers with a design-based intervention perspective, aimed at self-designing technological environments that caregivers can use to support autistic young adults (AYA) in designing everyday 'one-size-fits-one' solutions. This will be done without the intervention of a designer or engineer. The toolset will put design tools in the hands of people using technology themselves.

Methods:

The first version of the toolkit was developed using insights from ten design case studies conducted with AYA and caregivers. These cases were conducted using a research-through-design approach. Promising methods from the design literature were applied in these and contrasted with the lived experiences and practical contexts of AYA and their caregivers. The results of the case studies were then analyzed using grounded theory (GT). For this purpose, the data from the case studies were spread out in data boards. Three coders then interacted to look for similarities, differences, and salient aspects. These were noted down on sticky notes.

Results:

The GT-analyses resulted in a total of 347 observations. From these, ten different categories were identified for the design direction of the toolkit. For example, what both the AYA and the caregiver appreciated was the 'bottom-up approach', where the AYA is more central, the caregiver has a more supportive role and (technological) solutions are not provided top-down by the organization. Another category is about 'autism-specificness'. In most case studies, the focus was precisely not on specific autism characteristics. The autistic participants indicated that interventions that put a lot of emphasis on their 'autistic disabilities' could be counterproductive. On the other hand, we also noted difficulties in activities involving thinking or imagining the future. This may be due to autism. Design activities will need to devote specific attention to the caregiver's supportive role for this aspect.

Conclusions:

The added value of this method for caregivers is that it allows them to support AYAs in a practical, "designerly" way to realize technological solutions. To this end, the existing design tools will have to be carefully selected and adapted. Moreover, the extent to which the findings are generic or unique will be further investigated. Thus, how the method itself should be adaptable to users' preferences will have to be examined more closely. In a series of test studies that will follow, the toolkit will be iteratively further developed and evaluated in practice.

435.249 (Poster) Grandparents of Autistic Children – Needs and Intervention

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Background: In a family system where an autistic child is present, grandparents’ role has become increasingly important: they provide instrumental and emotional support to their grandchild and adult children. Research has shown that grandparents of autistic children may have their own needs and require support in relation to their autistic grandchildren. To support grandparents of autistic, preschool-aged children, the Autism Center for Young Children (ACYC) at Habilitation & Health in Stockholm offers a day-long, group-based manualized intervention with the main goal to address grandparents’ heterogenous needs and challenges they may face when grandparenting an autistic child. The intervention is multimodal as it combines components from various approaches—psychoeducation, skills training, and the use of support groups.

Objectives: The research project consists of three interrelated studies. Study 1 examined perceived needs of grandparents of preschool-aged autistic children in the areas of information, family and social support, financial support, explaining to others, child care, professional support, and community service; and explored associations between grandparents’ needs and their socio-demographic characteristics, and perceptions of grandchildren’s difficulties. Study 2 assessed feasibility and preliminary effectiveness of the group-based psychoeducational intervention program offered to grandparents of young autistic children. Study 3 explores experiences of the grandparents five years after their participation in the intervention program in 2017.
Methods: In Study 1 the participants were 120 grandparents of children enrolled into autism intervention programs provided by the public disability services in Stockholm. The Grandparents’ Needs Survey, the SDQ Impact supplement, and the demographic survey were used to collect data. Study 2 used an open pragmatic design and applied a mixed-methods approach to evaluate the intervention’s feasibility and preliminary effectiveness. Study 3 uses a qualitative design with 14 grandparents who participated in semi-structured follow-up interviews.

Results: The results from Study 1 showed that grandparents expressed most needs in topic areas of information and childcare. No significant relations were found between grandparents’ demographics and perceptions of needs; grandparents’ needs were predicted by their perceived burden. Findings from Study 2 demonstrated good feasibility: completion rate was 95%. The results showed increased knowledge about ASD from pre- to post-intervention; qualitative analyses showed grandparents’ appreciation of the opportunity to meet and share experiences with other grandparents. Preliminary findings from Study 3 show grandparents’ active involvement in grandchild’s lives: they babysit, provide transportation and other instrumental support to their adult children. Findings also indicate higher levels of distress among grandparents who had grandchildren with co-occurring neurodevelopmental conditions, e.g., ADHD, intellectual disability or with chronic medical conditions such as diabetes type 1. Some grandparents may experience social stigma and discrimination toward their grandchild with a disability in local communities.

Conclusions: Findings contribute with increased knowledge about needs and perspectives of grandmothers and grandfathers of autistic children in the context of disability services provision in Sweden. There is a need to design and implement a transdiagnostic intervention aiming at grandparents of children with co-occurring neurodevelopmental conditions to promote the mental health and wellbeing of this population.

435.250 (Poster) Parent Outcomes Following Cognitive Behaviour Therapy for Autistic Children in a Community Setting

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Background: Parents of autistic children are at higher risk for mental health problems, including anxiety, depression and stress (Lai et al., 2015), and these experiences may be related to children’s mental health and behaviours as well as family functioning more broadly (Smith, 2004; Hastings, 2003; Allik et al., 2006). Cognitive behaviour therapy (CBT) that targets children’s emotion regulation difficulties (i.e., reactivity; inability to regulate intense and highly rising negative emotions, and dysphoria; lack of positive affect, motivation and the presence of sadness and anxiousness) may have an indirect influence on parent outcomes, especially if they play a supporting role in the intervention (Beaumont, 2015). Indirect benefits of participation may include improvements in family functioning (Keeton et al., 2013), parent anxiety (Reaven et al., 2015), stress (Weiss et al., 2014), and depression (Maughan & Weiss, 2017). However, the majority of these studies were carried out in highly controlled research settings. To the best of our knowledge, no study has examined the parent outcomes of child-focused CBT in a community setting.

Objectives: This study examined parent outcomes (i.e., mental health and mindful parenting) following a community-based CBT program for autistic children, delivered across 7 community-based agencies in an online format. The study also explored associations between parent (i.e., mental health and mindful parenting) and child outcomes (autism symptoms and emotion dysregulation) using change scores.

Methods: 77 parents (94% women; M = 42.5 years, SD = 5.7 years) and their children (79% males; M = 9.9 years, SD = 1.3 years) completed a 10-week virtual, group-based CBT intervention, the Secret Agent Society (Beaumont, 2015). All children had a confirmed autism diagnosis from a regulated health care professional. At pre- and post-intervention, parents completed the 21-item Depression Anxiety Stress Scales (Lovibond & Lovibond, 1995) and the Bangor Mindful Parenting Scale (Jones et al., 2014) for parent outcomes, and the Social Responsiveness Scale, Second Edition (Constantino & Gruber, 2012) and the Emotion Dysregulation Inventory (Mazefsky et al., 2018) for child outcomes.

Results: Paired sample t-tests indicated greater mindful parenting post-intervention compared to pre-intervention, t(74) = -3.5, p < .001. There was no significant change in parent mental health pre- to post-intervention, t(76) = 0.6, p = .60. Pearson correlations demonstrated that improvements in mindful parenting were associated with reductions in child dysphoria (r(72) = .33, p = .004) and greater improvements in parent mental health were associated with reductions in child emotional dysregulation: reactivity (r(72) = .25, p = .04) and dysphoria (r(72) = .31, p = .007). Changes in mindful parenting and parent mental health were not associated with changes in children’s autism symptoms.

Conclusions: This study contributes to our understanding of the potential impact of implementing evidence-based interventions in real-world settings for parents, indicating that parent changes are associated with child changes in emotion regulation. Understanding variability
in parent outcomes for families can help inform intervention design by involving parents in their children’s interventions. Study limitations include the use of only parent-report measures and the lack of a control group or randomization.

435.251 (Poster) Parental High Elaborative Reminiscing Predicts Improvement in Autistic Children’s Episodic Memory and Theory of Mind

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Background: Episodic memory (EM) - memory for past personal experiences - is foundational for the development of a range of social-cognitive functions. One of these is theory of mind (ToM) which is developmentally and functionally intertwined with EM. An impressive body of literature has documented that one particular caregiver interaction style (i.e., elaborative reminiscing (ER)) causally and positively impacts neurotypical children’s EM and ToM. Despite its empirical basis and theoretical importance, no formal interventions have been developed to support EM in autism.

Objectives: This study evaluated a new caregiver-mediated intervention that adapts the principles of ER in ways that align with best practices for supporting EM and ToM in autistic children. We used an uncontrolled pre-/post-intervention/8-week maintenance design to evaluate the intervention’s potential for therapeutic outcomes: 1) parents will increase and maintain their use of an elaborative reminiscing interaction style, 2) children will demonstrate and maintain improvements in EM and ToM.

Methods: Participants were 24 caregivers and their autistic children (20 males; ages 6-15 years; \( M = 9.25 \)). Parent training in elaborate reminiscing (total time = 3 hours) was modeled after well-established training programs and manualized in a standard operating procedure. Parents implemented the intervention for eight weeks (5 minutes a day/5 times a week). During the maintenance phase, parents determined and recorded the frequency/duration of intervention. To assess the quality of parental talk across phases of study, structured parent-child interactions were transcribed and coded reliably for the presence of elaborative statements. Children’s EM was assessed using a cueing task (to tap memory specificity) and a Remember/Know task (memory accuracy), and ToM was assessed using a task battery. Parents’ impressions of the social validity of intervention were collected and analyzed qualitatively.

Results: From pre- to post-intervention, parents increased their use of elaborate reminiscing, and children demonstrated improvements in EM specificity and ToM. Memory accuracy also improved but only among children with high or age-typical language developmental levels. At follow-up, parents maintained a high elaborative style, and children maintained ToM gains; however gains in EM specificity returned to pre-intervention level: an outcome that was associated with a drop in intervention dosage during the maintenance phase. Parents reported that elaborate reminiscing supported successful communication with their children.

Conclusions: Parents can be taught to use and maintain a high elaborative style. High elaborative reminiscing predicts improvement in autistic children’s EM and ToM but diminution of intervention dosage after a brief intervention period may obviate gains in cued memory performance. The findings justify further study of the therapeutic potential of this novel caregiver-delivered intervention. Future research should employ experimental designs to address threats to internal validity, and explore how duration and intensity of intervention affect children’s performance on various measures of EM and ToM.

435.252 (Poster) Pilot Randomized Control Trial of a Theory of Mind Caregiver Training in Iran

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Background: Theory of Mind (ToM) skills in children with ASD are often impaired, with consequences on the ability to create and maintain effective social relationships with others. Teacher or parent-mediated ToM interventions have been shown to be effective, however few studies have been conducted in non-Western settings. In Iran, therapist-led ToM interventions have recently been tested (Adibsereshki et al. 2015; Yaghooti et al. 2019), but parent-mediated interventions have not been examined.

Objectives: To examine preliminary effectiveness of a ToM caregiver-mediated intervention in Iran

Methods: The study is a two-arm pilot RCT conducted in private health settings in Iran. Participants were parents of children with ASD. Inclusion criteria for children were: (a) clinical diagnosis of ASD, (b) age 6-10 years, (b) Autism Spectrum Screening Questionnaire (ASSQ) score above cutoff. Participants were randomized to an 8-sessions parent-mediated ToM intervention based on “Teaching Children with Autism to Mind Read” (Howlin et al. 1999) adapted for use by caregivers (n=25) and a treatment as usual (TAU) condition (n=25). The groups (N = 50; mean age = 86.66 months; 26 boys) did not differ on child age, gender, ASSQ, WISC-IV FSIQ and parent educational level (all ps > 0.05). Intervention contents include emotional understanding and information state ToM skills; children are taught ToM skills through a question-answer approach with corrective feedback. In weekly 1-hour training sessions with a clinician caregivers practiced through role play. Caregiver independent practice at home consisted of applying the same question-answer approach to the children with provided materials. The primary outcomes were ToM skills measured with the Persian version (Ghamrani et al., 2006) of the TOM test
(Muris et al., 1999). The TOM test, consisting of vignettes, stories, and drawings, yields a Total score and three subscales: Precursors of Theory of Mind, First Manifestations of a Real Theory of Mind, and More Advanced Aspects of Theory of Mind. The α in our sample was excellent for the Total TOM Score (α = 0.86) and the three subscales (respectively, α = 0.81, α = 0.77 and α = 0.74).

Results: To assess the effect of group membership, between-subjects ANCOVA models were run on post-intervention change scores of the primary outcomes, adjusting for baseline scores. The intervention group improved significantly more on the TOM Total Score (F = 13.25, p = 0.01), with a large effect size (0.22) and at subscale level, on the Precursors of ToM and First manifestations of TOM subscales respectively with large (0.11) and medium (0.08) effect sizes, but not on the Advanced TOM subscale (F = 2.90, p = 0.09).

Conclusions: To our knowledge, this was the first randomized controlled study of a ToM caregiver training conducted in Iran. Findings showed that an acceptable and feasible caregiver-mediated intervention for ToM skills in children with ASD can lead to benefits on precursors and first manifestations of ToM. Study limitations include lack of formal assessment of fidelity of implementation and small sample size. Future studies are needed to examine factors affecting treatment effectiveness on the more advanced ToM components.

435.253 *(Poster) Pilot Results from a Novel Social Functioning Treatment Program Study
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Background: Few social functioning treatment programs exist for adults on the autism spectrum. TUNE In (Training to Understand and Navigate Emotions and Interactions), a 17-week cognitive behavioral treatment program, was developed at the University of Pennsylvania to support social functioning in autistic adults by addressing social anxiety and motivation (component 1), social skills and cognition (component 2), and generalization to community settings (component 3). Component 1 consisted of 5 individual sessions, component 2 consisted of 8 group sessions broken into two parts (didactic and conversation practice), and component 3 consisted of 4 advocacy group project sessions. Components were designed based off Pallathra et al (2018).

Objectives: The current study aimed to test the efficacy of TUNE In to improve social functioning via a randomized control trial.

Methods: To date, 19 participants (7 randomly assigned to active treatment, and 12 to control) completed participation and study measures. Reliable change index (RCI) was utilized to examine improvements in informant-reported social functioning via the Social Responsiveness Scale, Second Edition (SRS-2). RCI evaluates whether an individual’s change over time is statistically significant considering standard error of measurement. After completing the treatment, 6 treatment group participants agreed to provide feedback on TUNE In via an interview. Responses were recorded verbatim.

Results: Of the 7 participants in the treatment group, 3 (43%) reliably improved, while 4 (57 %) did not show any reliable change. Of the 12 participants assigned to the control group, 2 (17%) reliably improved, 6 (50%) did not show reliable change, and 4 (33%) reliably deteriorated. The majority of participants stated that they were able to apply skills from component 1 (5/6 participants) and component 2 (4/6) to component 3 and to their daily lives. More than half of participants (4/6), felt that the didactic portion of component 2 (focused on social cognition) translated into the conversation practice portions of component 2 and half (3/6) felt that the conversation practice was the most useful part of component 2. Generally, participants found benefit from component 3 (5/6), with all participants (6/6) indicating they felt empowered by component 3.

Conclusions: Overall, this pattern of results suggests that a greater portion of participants in the treatment group improved in social functioning during the study. However, results also suggest variable response within both groups. Overall participants indicated receptiveness to TUNE In, with varying views on the most useful parts of sessions and the most applicable skills and tools. A second cohort is currently enrolled in the TUNE In RCT and additional data collected will be presented at the INSAR 2023 meeting. With this larger sample size, future analyses will examine potential moderators and mediators of treatment response.

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Background: Autobiographical memory (ABM) is memory about the self, including facts about oneself (semantic memory [SM]) and recall for past personal experiences (episodic memory [EM]). SM and EM are integrated in typical ABM development but may diverge in autism; whereas SM appears relatively intact, disruptions in EM are well documented. Several theories have been proposed to explain ABM differences in autism and experimental research has implicated a variety of potential mechanisms and cognitive processes. Still, the most common task paradigms lack ecological validity and are not well suited for understanding how ABM in autism might operate in situations that are personally meaningful and relevant for the individual. This information is crucial for understanding the heterogeneity, practical
impact, and subjective experience of ABM in autism and for the development of individualized interventions to support learning and cognition.

Objectives: In study one, we sought to capture parents’ impressions of their autistic children’s ABM to understand ABM strengths and challenges for the purpose of treatment planning. In study two, we solicited testimony from autistic adults to identify themes across participants, describe heterogeneity, and apprehend the phenomenology, or subjective experience associated with ABM differences.

Methods: We conducted two separate qualitative studies. In study one, parents (n=20) of autistic children (ages 6-15 years) completed the ABM Caregiver Interview (ABMCI) prior to their participation in an ABM parent-training intervention. The ABMCI is a semi-structured interview comprised of 12 open-ended, non-leading questions with standardized prompts. Initial questions were broad to be as inclusive as possible with regard to the potential variation in responses. In study two, 123 autistic adults rated the quality of their ABM and provided open-ended responses that described their subjective ABM experiences. All responses were analyzed using an inductive, open-coding process. In an initial analysis, data were scrutinized by survey item. In a subsequent analysis, subthemes were identified across items and respondents.

Results: In study one, parent report revealed individual child ABM profiles (strength and challenge areas) as well as the following themes: 1) strength/superiority in SM accompanied by impoverished EM, 2) a facilitative effect of task support, 3) the deployment of alternative memory frames (e.g., books, play episodes, focused interests), and 4) wide variability in functionally-related domains (e.g., spatial grounding). The results of study two were highly consistent with these themes but went beyond them by describing the practical impact and subjective experience of ABM from a first-person perspective.

Conclusions: Parents provided rich descriptions of their children’s ABM that are informative for designing and implementing parent interventions (described in the following presentation). The themes identified in parent testimony largely corroborated existing research providing tentative evidence for the validity of the qualitative assessment procedures. Moreover, the heterogeneity in reports by both parents and autistic adults involving the quality of ABM and ABM-related functions was notable, theoretically potent, and clinically meaningful. Analyses suggest new insights into the potential for different structures, organizations, and experiences of ABM among autistic people.

435.255 (Poster) Quality of Life: An Overlooked Health Outcome for Children with ASD

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Background: Children with autism spectrum disorder (ASD) experience greater health disparities compared to neurotypical (NT) children of the same age. Previous intervention research has emphasized increasing levels of physical activity and decreasing rates of obesity among children with ASD, but there has been limited impact on either outcome. Of greater concern should be that parents of children with ASD have reported lower levels of overall health-related quality of life (QOL).

Objectives: The primary objective of this research was to examine health related QOL among children with ASD and children with NT development. To understand patterns of change with increasing age, comparisons from early to middle childhood were also examined.

Methods: 50 children with ASD (39 boys) and 51 NT children (40 boys) between the ages of 3 and 9 years (MASD = 6.39 ± 1.98, MN = 7.15 ± 2.00) were divided into two age groups reflecting early (3 to 5 years) and middle (5 to 9 years) childhood. ASD diagnosis was confirmed using the ADOS-2; comparison scores ranged from 4 to 10 (M = 7.15 ± 1.59). Cognitive level was estimated for children with ASD. The MSEL was administered to all children with ASD between 3 years of age to 9 years of age. Depending on level of expressive language, the WASI-2 or Leiter-3 was administered to children with ASD between 6 and 9 years of age. Overall, 33% of children with ASD were estimated to have IQ scores below 70 and were classified as having an intellectual disability. The Pediatric Quality of Life Inventory (PedsQL) was completed by parents as an estimate of each child’s QOL. The PedsQL includes 23 items across 4 scales to measure dimensions of physical, emotional, social, and school/daycare functioning. Two summary scores were calculated: (1) Physical QOL (physical functioning) and (2) Psychosocial QOL (emotional, social, and school functioning). Independent samples t-tests were used to compare QOL scores between children with ASD and same aged NT children for each age group. To assess the effect of age on QOL, independent samples t-tests were used to compare QOL scores between early and middle childhood. Cohen’s d was used to calculate effect sizes.

Results: Across early and middle childhood, children with ASD had significantly lower parental estimates of physical QOL (p-values < .001; d = 1.58 – 1.68) and psychosocial QOL (p-values < .001; d = 1.90 – 1.99). With increasing age, physical QOL scores remained relatively consistent and psychosocial QOL scores decreased (ns) for children with ASD and NT.

Conclusions: In early childhood, parent perceptions of their child’s health-related QOL is already significantly lower among children with ASD. Although the pattern of change with increasing age is similar, the significantly lower QOL scores for children with ASD in early and middle childhood warrant further exploration. These results support the need to focus on interventions that improve QOL and well-being in
Background: Reading comprehension impairments impact as many as 60% of individuals with autism spectrum disorder (autism) and are associated with language, cognitive, and social communication challenges (e.g., McIntyre et al., 2017). There are very few evidence-based interventions to support reading comprehension for children with autism, and education professionals have expressed that they lack the training and resources to support these students (Accardo & Finnegan, 2019). This is especially true with learners with autism who have co-occurring intellectual disability (ID; Knight et al., 2019). Few studies have examined reading instruction in autistic children with ID (an estimated 32% of individuals with autism), and those that have often focus on decontextualized approaches such as sight word or letter-sound instruction.

Objectives: This presentation will provide information the feasibility, acceptability, and initial efficacy of an adaptation of an evidenced-based reading intervention, Building Vocabulary and Early Reading Strategies (BVERS; Henry & Solari, 2020; Solari et al., 2020), with children with autism and ID. We will discuss data answering two research questions: (1) Is the adapted BVERS intervention feasible and acceptable to educators for use with elementary-aged children with autism and ID? (2) Does the adapted BVERS intervention demonstrate promise for supporting language and literacy growth for elementary-aged children with autism and ID?

Methods: Eleven children with autism (grades K-2) who had mild to moderate intellectual disability participated in this 4-week trial of the adapted BVERS shared reading intervention. Child language and literacy data was collected at pretest and posttest using the CUBED Narrative Language Measure Listening subtest and Concepts About Print (Clendon et al., 2021). Five educators enrolled in the study and implemented the adapted BVERS curriculum 4 times per week for 4 weeks. Following the intervention, educators completed a feasibility and acceptability survey. Intervention activities included a read-aloud of a target text, an emergent writing activity, and explicit instruction in key story vocabulary. Adaptable to the intervention included visual supports and hand gestures to allow students to access comprehension concepts and demonstrate their learning through verbal and nonverbal means.

Results: At pretest, children’s mean nonverbal IQ as measured by the Raven’s-2 = 62.1 (SD=18.8) and mean receptive vocabulary as measured by the PPVT-5 = 54.5 (SD=14.8). There was no attrition in this sample across the four-week intervention period. Educators reported high levels of feasibility and acceptability. Wilcoxon Signed-Rank tests showed statistically significant growth in concepts of print, $z = -2.25, p<0.05, r = -0.59$. There was no significant difference in participants’ CUBED narrative language scores from pretest to posttest.

Conclusions: The results of this pilot trial find that this intervention is feasible to implement on a regular basis in school settings and has strong social validity, and that teachers find the intervention acceptable for use in this population. Additionally, there is evidence that a key element of literacy development, concepts of print, showed improvement following the BVERS intervention. When including adaptations such as tactile and visual supports, shared reading activities can offer students with autism and ID increased opportunities for reading and language development.

**References:**

Results: Following PRT, there was a significant reduction in the RBS-R Total Score from baseline ($M = 25.92$) to posttreatment ($M = 22.68$): $t(24) = 1.753, p = .046$. There was also a significant decline between the baseline ($M = 4.04$) and posttreatment ($M = 3.36$): $t(24) = 1.846, p = .039$. While not statistically significant, there was a decline across all other subdomains of the RBS-R: Self-Injurious Behavior, Compulsive Behavior, Ritualistic Behaviors, Sameness Behaviors, and Restricted Behaviors.

Conclusions: On average, RRB symptom severity was significantly reduced following a 16-week trial of PRT. Notably, there is a significant difference in the Total score and Stereotyped Behavior score on the RBS-R from baseline to posttreatment. The participants demonstrated improvements in the other subdomains of Self-Injurious Behavior, Compulsive Behavior, Ritualistic Behaviors, Sameness Behaviors, and Restricted Behaviors; however, the magnitude of the difference was not significant, likely because the behaviors were low frequency and/or mild at baseline. In this trial, PRT directly emphasized social communication skills, such as initiation and reciprocity. These results, therefore, indicate that focusing on social communication skills may have an indirect effect on reducing RRBs among children with ASD.

435.258 (Poster) Robot Vs. Tablet: How Do Children with ASD Perform and What Do They Prefer? A Preliminary Study

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Background: Society faces several challenges in the care and education of people with autism regarding cost, accessibility, and turnover. One promising tool receiving researcher’s attention is the use of robots in the care of children with autism spectrum disorder (ASD). Robots offer numerous possibilities in terms of therapeutic and educational applications, knowledge transfer, and care’s accessibility (e.g. Diehl et al., 2012; Huijen et al., 2016). Even if robots seem to be a promising tool for children with autism, they are not widely available on the market, are not necessarily easy to use, and are relatively expensive. Even, if robots provide an embodiment of multi-modal aspects, which may play an important role in interpersonal relations (Dautenhahn & Werry, 2004), it is uncertain how much benefit it brings compared to tablets that provide almost the same advantages.

Objectives: Our study investigated which difference may exist between the use of these two technologies. Therefore, we examined how children with ASD interacted with each device and how they enjoyed similar interactions.

Methods: Eleven boys diagnosed with ASD aged 9 to 17 years ($M = 12.45, SD = 3.30$) listened to two stories for children provided by a tablet or robot. Children’s characteristics are visible in Table 1. Both devices displayed the same face, and both stories were of similar content, duration and number of questions. The design was repeated and counterbalanced, and conditions were similar. Before the interaction started, the children could interact freely with the device (tablet or robot) for one minute in a restricted area. The interactions were video recorded, and children’s behavior, proximity, eye gaze, answers, and preference were assessed.

Results: Statistical analyses demonstrated no difference regarding children’s proximity and eye gaze. Children also responded a little more correctly to the three questions asked with the tablet ($M =1.64, SD =.67$) than to the ones asked by the robot ($M =1.27, SD =1.01$) but this difference wasn’t significant ($Z =- .48, p =.63$). However, children showed more stereotyped and repetitive behaviors when interacting with the robot than with the tablet ($Z =-2.55, p <.01; r =.76$). Finally, children expressed a clear preference for the tablet storyteller (72.7%) than with their usual teacher (9.1%) or the robot (0%).

Conclusions: Despite not finding significant differences in children’s performance across devices, children preferred the tablet to the robot. Tablets might be easier to handle and more familiar, as children are more likely to have had previous contact with tablets. Finally, our results raise questions about the embodied multi-modal advantage that robots are thought to provide to children with ASD compared to tablets (Dautenhahn & Werry, 2004).

435.259 (Poster) “Peeling Back the Layers of the Onions”: Refining an Emotion Focused Therapy Expressive Writing Intervention for Autistic-LGBQ Individuals

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Background: Emerging research has documented the high prevalence of gender and sexual minority individuals within the autistic community (George & Stokes, 2018; Warrier et al., 2020), but there has been limited research on the impact of prejudice events on this population. Expressive writing interventions have been found to effectively reduce symptoms of psychological distress, including coping with distress related to one’s sexual minority identity and identity-based hate speech (Pachankis & Goldfried, 2010).
Objectives: The present study explored the experiences of autistic, gay, bisexual, and queer (LGBQ+) individuals completing an online expressive writing intervention designed to process distressing heterosexist events. The central question of this study was, how did participants experience the Emotion Focused Therapy condition when processing heterosexist events?

Methods: Ten autistic-LGBQ+ participants who completed the month-long intervention study were invited to participate in a follow-up interview. All participants were from the experimental condition, which consisted of semi-guided prompts informed by an Emotion Focused Therapy approach to deepen processing (Elliot & Greenberg, 2007). The mean age of participants was 33.1 (SD = 11.7), and most participants identified as White. All participants were autistic and LGBTQ-identified and had endorsed a distressing heterosexist event, as this was part of the study criteria for the intervention study. We analyzed our data using a modified version of grounded theory methodology (Glaser & Strauss, 1967), which consisted of breaking data from each interview into meaning units or labels describing the main ideas in the transcript (Giorgi, 1970).

Results: Results of this grounded theory study consisted of six clusters comprised of multiple subcategories and 360 meaning units (see Table 1). The first three clusters focused on participant changes and engagement with the exercises over the course of three days of writing, for instance as found in cluster 3: It was “liberating” to notice positive changes in meeting my needs, speaking out, and develop new insights about myself as an LGBTQ autistic person. For instance, “In the weeks following, I found myself a lot more confident advocating...I don't feel that hesitancy now that I've like processed stuff that happened the night before.” The third clusters spoke to larger considerations for intervention research due to their positionality as autistic queer people, as highlighted in cluster 4: Adding prompts to increase accessibility and transparency of the exercises, would strengthen this already helpful intervention for many LGBTQ+ autistic people in processing stigma.

Conclusions: There are several implications for the present research. Firstly, the results provide support on the importance of centering autistic voices in the development and refinement of interventions to meet their needs. Participants identified aspects of the intervention that were helpful, as well as changes that could better support them, which we will discuss. Secondly, the study demonstrates the benefits of an online EFT expressive writing intervention in processing autistic LGBTQ people’s experiences of heterosexism. This semi-structured and open method appears to empower autistic people to engage in meaning-making and identify ways to meet their needs following experiences of sexual minority-based stigma.

435.260 (Poster) Services for Adolescents with Autism Spectrum Disorder and Intellectual Disability in Vietnam: A Qualitative Study

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Background:

Early interventions for young children with autism spectrum disorders (ASD) have been intensively researched and applied during past decades in Vietnam. Meanwhile, services for older children, such as social skills training and career guidance, are usually for adolescents with better potential. Besides, the connection between stakeholders, including education, medicine, and society, is loose and uneven across regions.

Objectives:

This study aimed to explore the model of services for adolescents with ASD and intellectual disabilities (ID) in 3 areas, including special and inclusive education, medical, and society, based on the report of parents, special educators, and medical staff.

Methods:

Qualitative study design was implemented with three main research methods: literature review, focus group discussions, and in-depth interviews. Twenty-five studies in Vietnam were identified, and 40 participants participated in this study (Table 1). The materials, discussions, and interviews focused on 2 objectives: (1) Needs for support in education, medical, and society of families with children with ASD and/or ID aged 10 – 16 years old; (2) Service and support provision for this population.

Results:

The families faced barriers in accessing instructional materials to support their children at home, especially difficulties in career orientation and future life. The information in Vietnam was limited and focused mainly on early intervention. They expected a friendly medical network with doctors who could interact with special children; expressed the need for social integration was reflected in not only employment but also in making friends and expanding social relationships through a social group with support from the university’s volunteers. Besides, they desired to receive psychological counseling for themselves and siblings of children with ASD/ID.
Currently, comprehensive and multi-stakeholder support in education, medicine, and society for adolescents with ASD/ID has not been developed in Vietnam. Only a slight connection between special education and medicine or the community exists. Regarding intervention centers, there are three activities provided in special centers: adaptive behavior assessment, intervention and career guidance for children, and parents training (Figure 1). As children get older, the participation rate in inclusive education decreases because the curriculum is more complicated, and there are no consistent policies on academic support for children in the classroom. Laws and policies for professional development for inclusive teachers are not uniformly enforced.

Current public vocational schools do not focus on children with ASD/ID, and parent-created vocational and career guidance models are challenging to maintain and cannot reach many children. In addition, employers do not welcome employees who are disabled, and the government does not have policies to support enterprises that receive workers with disabilities.

Conclusions:

Services for adolescents with ASD/ID in Vietnam are generally limited due to low resources from families after a costly early intervention process and a lack of care from professionals and policies. More attention needs to be paid to this population in future research and policies.

435.261 (Poster) Sexual Assistance for Autistic Adults: Experiences of Autistic Adults and Service Providers

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Background:

Although a large part of autistic adults has partnered sexual experience, some individuals experience barriers in finding a (sex) partner or handling an intimate relationship. Anxiety, fewer positive ideas about sexuality, less interest, and less sexual desire were reported by those with less partnered activity (Byers et al., 2013). In some countries, sexual assistance is available for individuals with special needs or disabilities. In Belgium and the Netherlands, sexual assistance providers reported that autistic persons or their supportive network regularly apply for sexual assistance. Sexual assistance aims to create learning opportunities regarding intimate and sexual interactions, for adults with limited sexual experiences or for adults who show inappropriate interests or behaviours.

Objectives:

The current study was designed to gain insight into the experiences and needs of autistic adults who apply for sexual assistance, aiming to understand facilitators and barriers for enjoying sexuality. These insights were expected to be helpful to improve sexuality education and support.

Methods:

A qualitative semi-structured interview study was set up in two groups (n = 15 participants): 4 autistic adults without co-occurring intellectual disability and 11 service providers with experience in sexual assistance to autistic adults with or without co-occurring intellectual disabilities. Three dyads were interviewed separately on their collaboration, other participants more broadly on their experience as service user or provider. Data were analyzed according to the Qualitative Analysis Guide of Leuven (QUAGOL) guidelines. The research topic and the preliminary results were discussed with an autistic advisory group.

Results:

Preliminary analysis of more than half of the dataset revealed a variety of experiences and needs before, during and after intimate, sexual interactions. Autistic adults apply for sexual assistance with a variety of backgrounds; from a lack of experience and ideas to very specific preferences about intimate and sexual interactions. Autistic adults and sexual assistants describe the need for predictability, clear and explicit communication, a step-wise approach when introducing new experiences, attunement to anxiety levels and sensory issues, and clear feedback on the interaction and the experiences of the sex partner. Sexual assistants need to be very proactive in adapting to the needs of the adults they work with and to create a safe space to learn about sexuality: they have to take the daily living context and abilities of the adults into account, be sensitive to previous (sometimes traumatic) experiences, discuss mutual expectations and limits explicitly, observe and attune to verbal and non-verbal reactions. By May 2023, data analysis will be completed.

Conclusions:
Some autistic adults experience barriers in entering and maintaining healthy sexual relationships. The interviews revealed a variety of barriers and needs to learn about and enjoy sexual interactions. Professional sexual assistants had a very proactive role in creating safe situations that can promote healthy sexual development and wellbeing. Yet, managing these professional relationships and stimulating transfer to their daily lives could be challenging. This study’s results offer cues for sexuality education and support to autistic adults and demonstrate the value of sexual assistance in terms of learning by experience.

435.262  (Poster) Skolkontakt(TM) - Pilot RCT of School-Based Social Skills Group Training for Autistic Youth
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Background:
Atypical socio-communicative behaviors, a hallmark feature of autism, contribute to social challenges which in turn are associated with increased risk for negative, long-term outcomes, such as educational underachievement, social exclusion, loneliness, and mental health issues. The clinically-based social skills group training KONTAKT™ has demonstrated solid evidence in improving social communication outcomes and individual social goal-attainment in autism. Given that interventions in natural educational context may enhance generalization of skills, build support capacities in society and have practical advantages for youth and families, SKOLKONTAKT™ has been adapted from KONTAKT to provide school-staff with a manualized method to conduct the intervention at school. Previous multi-perspective qualitative research on SKOLKONTAKT found that student, teachers and school leaders experienced the program to be feasible and adding value to practice and social climate.

Objectives:
To investigate the preliminary effectiveness of school-based, teacher-led social skills training (SKOLKONTAKT) to improving socio-communicative behaviors and accomplish personalized social goals in autistic students and others with social communication challenges.

Methods:
A pilot randomized, controlled trial with an active control group was conducted in a mainstream, extra resourced high school in Stockholm, Sweden. High-school students (N=26; age M=17.5; age range=16-21) diagnosed with autism or exhibiting social skills challenges were randomized to SKOLKONTAKT (n=12; boys=5) or a social activities group (n=14; boys=7). Pre to post or pre to follow-up intervention changes in self-, parent- and teacher (single-blind) reported outcomes as assessed by the Social Skills Group Questionnaire (SSGQ) (primary outcome) were analyzed. In addition, self-reported changes in quality on the KIDSCREEN-27, and social goal attainment using the Goal Attainment Scaling (secondary outcomes) were measured.

Results:
Despite challenges due to pandemic situation during the study, 70% (n=12) completed SKOLKONTAKT and 87.5% (n=14) completed social activity control groups. Drop-out in SKOLKONTAKT predominantly occurred following week one and rationales included overall anxiety and school attendance. SKOLKONTAKT participants improved SSGQ item level for across informants for Meeting new people”, as well as a range of other items for single raters. Subjective life quality improved following SKOLKONTAKT for indices physical health and friends. A larger proportion of social goals were attained during SKOLKONTAKT than in social activity control groups. Side-effects by interventions were reported as low-impact and proportionally fewer in SKOLKONTAKT.

Conclusions:
School-based social skills group training by SKOLKONTAKT is a safe and feasible intervention option for autistic students in educational settings. Preliminary findings following the pilot RCT suggests that the method enhances certain social skills, aspects of life quality and social goal attainment. A larger-scale study is desirable to confirm effects identified in this pilot.

435.263  (Poster) Social and Aberrant Behavior Longitudinal Data: Findings from a Specialized School in Autism

Background:
Monitoring the progress of children with an autism spectrum disorder (ASD) both in school and at home to promote a school-based integrated care model between parents, teachers, and medical providers has proven to be feasible. We have conducted a longitudinal cohort study at a specialized school for ASD in California for the past 5.5 years using an online platform developed for teachers and caregivers.

Objectives:

Examining the average change over time for the following outcomes: Aberrant Behavior Checklist (ABC), Social Responsive Scale (SRS) and Pediatric Quality of Life (PedsQL) 4.0 for individuals with ASD at a specialized ASD School.

Methods:

This five-year longitudinal cohort study included 50 participants (aged 7-19 years) with ASD from a specialized school. Evaluations were completed by parents and teachers every 3 months included ABC, SRS and PedsQL. For the SRS, evaluations were done every year after January 2019. Recruitment for participants was ongoing throughout the study period, resulting in staggered entry.

Repeated measures analysis using mixed-effects models was used to determine whether there were significant changes in the mean ABC, SRS and PedsQL across the timepoints, with the participant (‘subject ID’) being defined as a random effect. Parent-reported and teacher-reported measures were analyzed separately.

Results:

The mean age for the participants at baseline was 14.5 ± 3.5 years, with males comprising 90% of the population. There were statistically significant improvements in the mean teacher-reported ABC (p=0.047), parent-reported SRS (p=0.038) and teacher-reported SRS (p=0.014), and quality of life (p<0.001) over time for all participants with ASD at Oak Hill School. On average, after five years in the study, there was a 13.4-point decrease in teacher-reported ABC (p=0.041), 15.3-point decrease in teacher-reported SRS (p=0.026), and a 16.5-point increase in PedsQL (p=0.026) compared to baseline. Parent-reported SRS decreased by 14.6 points compared to baseline after 3 years in the study (p=0.025). The average parent-reported ABC did not improve over time (p=0.5).

Conclusions:

The value of longitudinal outcome study is key to developing more efficacious and collaborative treatment plans for children with ASD. Several studies have generally shown that adolescent ratings of autism worsen over time. Therefore, it is an interesting finding to see overall improvement over 5.5 years. This specialized learning environment was beneficial as it led to significant improvements in their behavior, social skills and quality of life throughout their enrollment in the school. Future research will determine factors associated with the greatest and the least improvement with hope of matching focused treatments.

435.264 (Poster) Supporting Autistic Learners in School with Triple-a: Attention, Arousal and Anxiety
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Background: School classrooms are typically busy, complex multisensory environments, which are often quite unpredictable. They can lead to particular challenges for autistic learners, especially because many of these learners experience differences with “Triple-A” – namely, attention, arousal (sensory processing) and anxiety. Research from our group has shown how attention, sensory arousal and anxiety have an impact on the engagement and learning of autistic learners (Hanley et al., 2017; Jones et al., 2020, McDougall et al., 2020a, 2020b). On this basis, we developed an evidence-based online training tool targeted at educators (but freely accessible to all) to change understanding of Triple-A and confidence for supporting learners with Triple-A needs.

Objectives: The main objectives were to evaluate the data from users of the Triple-A training tool on pre and post measures of their knowledge and confidence with supporting Triple-A needs at school. As well as that, data on users ratings of the training as well as intention to change were evaluated.

Methods: The Triple-A training tool was co-designed with key stakeholders (autistic people, parents, teachers, educational psychologists). Development work involved focus groups and workshops with key stakeholders to assess feasibility and acceptability. It was launched in March 2022. Data from users was collected via the online training tool. At this point (Oct 2022), over 2000 users have registered for the training.
Results: To date, 47% of completers have provided evaluation data. Feedback has been overwhelmingly positive, and paired samples t-tests show that participants reported significant increases of both knowledge, \(t(82) = -12.115, p<.001\), and confidence, \(t(83) = -10.52, p<.001\), with supporting Triple-A needs. Ninety-two percent of participants reported they would change their practice based on the training.

Conclusions: The Triple-A training tool improves knowledge of a hidden set of challenges commonly experienced by autistic pupils - Triple-A needs - as well as confidence for supporting autistic learners at school.

435.265 (Poster) Supporting Secondary Teachers to Successfully Implement a Self-Determination Curriculum
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Background: Self-determination has been consistently identified as a transition predictor for improving post-school outcomes for students with disabilities through multiple rigorous systematic literature reviews. Youth with higher self-determination scores were shown to have better employment and higher pay, and enhanced recreation and leisure participation post-school. However, autistic students have lower levels of self-determination compared to peers with and without disabilities. Direct teaching of skills and infusion of self-determination components into the school curriculum support students in learning and taking more self-determined actions. Self-determination interventions have been developed to help structure lessons and provide teachers with strategies that can be infused into current classroom practices.

Objectives: A teaching model that has seen success in high school classrooms is the Self-Determined Learning Model of Instruction (SDLMI). SDLMI allows students to self-direct the instructional process across multiple academic and non-academic content areas by setting goals, planning actions, and evaluating progress. However, as every classroom is different and students each have their own unique needs, there is a need to tweak the intervention in ways that will allow teachers to best deliver the intervention while meeting their students’ needs. Through working and learning alongside teachers on the Propel Project (a classroom-based intervention study for autistic high school students that includes SDLMI), this presentation aims to discuss ways that the SDLMI can be adapted in classrooms to support student goal attainment and outcomes.

Methods: Teacher modifications to the SDLMI curriculum were recorded by coaches on the research team during coaching sessions throughout the implementation year. We also gathered student (n=19) and teachers (n=14)’ perspectives about the SDLMI through individual and group interviews, and all participants completed a User Rating Profile (URP) survey post-intervention.

Results: Teachers shared enthusiasm about implementing SDLMI in their classrooms (mean=5.2/6), and felt administrators are supportive of their use of this intervention (mean=5.4/6). Ways that teachers adapted the SDLMI include modifying the language and vocabulary used to be more accessible and engaging to students, incorporating visuals to help students better envision goals and increase accessibility (e.g., collage activity, visual supports), and using multi-modal resources (e.g., podcasts or videos with sign language) and personal connections (e.g., student interests) related to SDLMI lessons.

Conclusions: Teachers can successfully implement SDLMI in their classrooms and support the development of self-determination in autistic students by adjusting and adapting existing intervention materials to meet the specific needs of students in their high school classrooms.

435.266 (Poster) Systematic Review of First-Person Accounts of Autistic People about Mental Health-Related Services
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Background: Autistic adults are at high risk of co-occurring mental health disorders, including depression, anxiety, and suicidality (Buck et al., 2014; Cassidy et al., 2014; Lever & Geurts, 2016). Among the autistic community, the available mental health-related services are often critiqued as inadequate or unsatisfactory for autistic clients’ needs. Overall, there appears to be a mismatch between the services that are offered and the preferences of many autistic people. Unfortunately, research about mental health-related services for autistic people has been evaluated by healthcare professionals, parents, or siblings, while the voices of autistic individuals have been largely left out (Prince 2010), despite clear research evidencing autistic people want to be listened to, consulted, and involved in the field of autism services (DePape & Lindsay, 2016).

Objectives: Through a qualitative meta-analysis, to synthesize and integrate results from studies examining first-person perspectives of autistic people’s experiences with mental health-related services.

Methods: We identified 33 studies of first-person experiences from autistic adults about mental health-related services that met inclusion criteria for this review. Eight studies examined participants’ experiences and needs with mental-health related services generally (i.e., studies that asked about different types of services), and twenty-five studies explored participants’ experiences attending specific services...
such as social skills trainings, support groups, peer mentoring programs, and therapy services. The studies used obtained first-person perspectives through interviews (n=17), surveys (n=7), focus groups (n=5), mixed method approach (n=3), and diaries (n=1) and ranged from 1 to 200 participants in sample size; most samples fell between 7-52 participants. To analyze the data, we used a modified grounded theory method (Glaser & Strauss, 1967), such that the main themes from each of the 33 studies were summarized and labeled in the form of meaning units. These meaning units were compared to one another, and categories were formed based on commonalities. These categories were then compared to create higher-order categories to come up with our themes.

Results: Five overarching themes emerged from qualitative analysis; these included: (1) the need to individualize and tailor services towards the heterogeneity of the autistic community, (e.g., teaching how to cope with overwhelming sensory experiences as opposed to focusing on thoughts, using more concrete strategies and visuals during therapy as opposed to typical “talk therapy,” asking more concrete questions) (2) a need for accessible environments that take into account sensory sensitivities and time structures that accommodate autistic people’s preferences (e.g., desire for routine), (3) a desire for services that provide practical support (e.g., employment tips, filling out paperwork) (4) desire for service providers to have autism-specific knowledge as well as humility in not considering themselves “autism experts,” and (5) importance of embracing autism culture and connectedness with other group members.

Conclusions: Overall, autistic people indicated a desire for greater variation in types of services offered, greater training and humility among service providers, and a clear need for more affirming and strength-based views of autism and disability. Implications for clinical practice and research directions will be addressed.


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Background: Autism Spectrum Disorder (ASD) is defined by differences in social communication, social interaction and restricted/repetitive behaviors and interests. Difficulty with imitation, motor control, and coordination are also common in this population. Motor interventions have resulted in positive outcomes in motor skills in individuals with ASD. However, the overall effects of motor intervention on social, communication, or cognitive skills in individuals with ASD is unclear.

Objectives: To systematically review the literature for motor/physical activity interventions for individuals with ASD from 0-21 years of age and assess effects on motor, social, cognitive, or communication outcomes.

Methods: This review was conducted in accordance with the Cochrane Handbook for Systematic Reviews and the PRISMA guideline, see Prospero CRD42022331576. Electronic searches were conducted on EMBASE, PUBMED/Medline, PEDro, Cochrane Library, Web of Knowledge/Web of Science, CINAHL, and Clinical Trials databases in May 2021. Each abstract and full-text was independently rated by two reviewers using Covidence systematic review software and disagreements were resolved by a third reviewer. Eligible studies met the following inclusion criteria: (a) 0 - 21 years old, (b) males and females, (c) clinical ASD diagnosis, (d) less than 30% born preterm or had intellectual disability (IQ < 70), (e) RCT, (f) English, (g) published after the year 2000, (h) motor intervention, (i) uses social, communicative, or cognitive outcome measures. We used random-effects meta-analysis with robust variance estimation to estimate the overall effect of interventions on participant outcomes and meta-regression for moderator analysis; we used a trim-and-fill analysis and meta-regression to assess the potential for publication bias.

Results: Twenty three eligible studies were selected with 52 available outcomes. There were 620 participants, 87 females, mean age range of 4.3 - 12.25 years. Motor interventions had significant, positive effect on 1) all domains combined (synthesized standardized mean difference [SSMD]: 0.37, p=.026) 2) social domain (SSMD: 0.50, p=.012) and 3) combined social/communication domains (SSMD: 0.50, p=.012), but not for the motor or cognitive domains alone. There were too few combination measures for that domain to be analyzed alone. Age was not a significant moderator (p=.08) of the overall effect. However, in children above age nine, a one year increase in age corresponded to a 0.30 decrease in SMD (interventions were less effective). Analyses suggested that publication bias was unlikely in the dataset.

Conclusions: Motor interventions were associated with improvements in combined developmental domains, particularly in social communication outcomes for children with ASD. Participant age may play a role in intervention effectiveness, but more intervention studies are needed. Although this meta-analysis did not suggest effectiveness for improvements in motor skills, many studies used motor measures as a baseline evaluation rather than an outcome measure. Some interventions were specifically designed to improve social or cognitive skills, so further research is needed. These results support the evidence that motor interventions can have a positive impact on developmental domains and should be increasingly considered as a routine clinical intervention for children with ASD.

435.268 (Poster) Testing the Efficacy of Training Parents to Use an Elaborative Reminiscence Intervention for Children with ASD


Background: Autism Spectrum Disorder (ASD) is defined by differences in social communication, social interaction and restricted/repetitive behaviors and interests. Difficulty with imitation, motor control, and coordination are also common in this population. Motor interventions have resulted in positive outcomes in motor skills in individuals with ASD. However, the overall effects of motor intervention on social, communication, or cognitive skills in individuals with ASD is unclear.

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Background:

Training parents to engage in elaborative reminiscing (ER) with their typically developing children has been found to significantly improve outcomes for typically developing children. Studies have reported significant benefits of ER for improving children’s memory (Waters et al., 2019, Wu & Jobson, 2019) and associations between ER and improvements to children’s theory of mind (ToM; Taumoepeau & Reese, 2013), and self-concept (Bird & Reese, 2006). This prompts speculation that ER could be a beneficial intervention for children with autism spectrum disorder (ASD), who have known difficulties in these areas (McDonnell et al., 2017). However, no randomised trials have yet evaluated the potential of an ER intervention for autistic children.

Objectives:

A two-arm randomised feasibility trial was designed to evaluate the preliminary effectiveness of training parents to use an ER intervention compared with an active control (“present-tense-talk”; PTT), with autistic children aged 7-12 years. From baseline to post-intervention, it was hypothesised there would be improvements to children’s i) episodic memory, ii) theory of mind (ToM), and iii) self-concept, for participants in the ER group vs PTT.

Methods:

Nineteen parent-child dyads were randomised to receive ER or PTT and instructed to use the intervention for 5-minutes a day, 6 days per week for 20-weeks. Children were tested pre- and post-intervention on measures of direct memory (CVLT-C: Delis et al., 1994) and functional memory (children’s memory elaborations and reminiscence quality; Reese & Newcombe, 2007), self-concept (SDQ-I: Marsh, H. W., 1992) and ToM (Theory of Mind Battery: Wellman & Liu, 2004). Post-intervention change to children’s performance on outcome measures were analysed for intervention differences using bootstrapped multiple regressions. Parent-child conversations were reliably coded (manual adapted from Reese & Newcombe, 2007) for change to parent “elaborativeness” to test for associations between this and change in child outcomes.

Results:

ER was a significant, large predictor of children’s immediate recall ($\beta = .67$, $p = .009$, [BCa 95% CI: .92, 3.25]) and was a positive (though not-significant) predictor for other aspects of children’s direct memory. Although not significant, ER was found to be a weak to moderate predictor of children’s reminiscence frequency ($\beta = .16$, [BCa 95% CI: -21.71, 38.88]) and quality ($\beta = .48$, [BCa 95% CI: -.74, 3.06]). ER was not found to predict children’s ToM ($\beta = .08$, $p = .66$, [BCa 95% CI: -.474, .696]) or self-concept ($\beta’s = -.27$ to -.11, $p’s > 0.5$) but these measures were unfeasible (e.g., ceiling effects). Significant positive correlations were found between change to parent elaborativeness and children’s functional memory ($r’s 0.57$ to $0.52$, $p’s <0.05$) but correlations with all other outcomes were weak and not significant.

Conclusions:

Results provide prima facie evidence that training parents to elaboratively reminisce with their autistic child can benefit aspects of children’s direct and functional memory, particularly their immediate free recall, but could be less beneficial for children’s ToM and self-concept. These first-stage preliminary findings indicate the potential benefits of using ER as an intervention for autistic children. Results are discussed with reference to recommendations for future research.
families of children with developmental disorders and delays and is delivered through caregiver-mediated engagement strategies. The CST which is recommended for use in low-resource settings, consists of nine interactive group sessions and three home visits delivered by trained non-specialists.

**Objectives:** 1) To investigate the acceptability and feasibility of implementing the CST programme in rural and urban settings in Kenya; 2) To evaluate the effect of the caregiver-based intervention on behavior, communication, and the quality-of-life outcomes of children with DDs and their families.

**Methods:** Using a sequential mixed-methods design, we adapted, and pilot tested the CST programme in Nairobi’s urban informal settlements and rural Kilifi. First, CST materials were translated to Kiswahili and pre-tested using qualitative approaches among caregivers and community stakeholders (n=85) to assess their acceptability and cultural appropriateness. In the second phase, 105 caregivers of children aged 2 -13 years with different neurodisabilities (including autism, attention deficit hyperactivity disorder [ADHD], cerebral palsy, intellectual disability, and epilepsy), participated in the CST pilot. Baseline and endline data were collected using a battery of measures (Child Behavior Check List [CBCL], Patient Health Questionnaire-9 [PHQ-9], Pediatrics Quality of Life TM [PedsQL], Parental Stress Index), and analyzed using descriptive statistics. Post CST intervention focus group discussions were conducted with caregivers to assess their experiences of the programme, and the data were analyzed thematically.

**Results:** The CST programme was considered acceptable and feasible to implement in different socio-cultural settings. Evaluation of the CST programme showed a decrease in mean difference scores (Endline-Baseline) for all outcome measures. This decrease was greater in the CST group than the non-CST group; mean differences in PedsQL average scores and preschool CBCL total scores were significant (P<0.05). Caregivers reported that the CST programme addresses the need for management and care for DDs, increased social support and contends with stigma and discrimination among families and the larger community.

**Conclusions:** The CST program is a promising intervention, and with adaptations to its content, structure, and delivery, serves an important and urgent need in Kenya and other resource constrained settings.

435.270 (Poster) The Effect of the Yoga Bali Program on the Anxiety of Children with Autism Spectrum Disorder As Well As on Their Quality of Life at School.

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**Background:** Anxiety disorders are the most common associated disorders in children with autism spectrum disorder (ASD). Without necessarily meeting the diagnostic criteria for a disorder, 80% of these children have anxious behaviors. This anxiety interferes with their quality of life (QoL). Among anxiety-provoking situations, school is one of them (e.g. change of teacher, oral presentations, exams). Besides medical and psychological interventions, new body-mind approach treatments, including yoga, are offered in a complementary way. Studies suggest that yoga appears to have the potential to ease anxiety symptoms in children with ASD.

**Objectives:** The objective of this study is to explore the effect of yoga practice on the anxiety of children with ASD and on their QoL in a school environment.

**Methods:** The sample is composed of 6 children with ASD (4 boys and 2 girls). The average age of this sample is 9 years old. The 8-week yoga Bali program was first adapted for children with ASD. A socio-demographic questionnaire was initially completed with one of their parents. A QoL questionnaire, the Systemic Quality of Life Inventory for Children (ISQV-E), and an anxiety questionnaire, the State Trait Anxiety Inventory for Children (STAIC), were completed with the children before the start of the yoga program and after it.

**Results:** The ISQV-E assesses the QoL of children in 20 domains of life, including school and grades, by measuring the gap between the current conditions in which they live compared to the conditions in which they would like to live for all domains (Dupuis et al., 1989). No significant difference was found on the “satisfaction with school” quality of life scales before (M = 3.22; SD = 6.86) and after (M = 1.20; SD = 1.39) the program (p > 0.05) and “school performance” before (M= 4.15; SD= 5.69) and after (M= 1.85; SD= 2.00) the program (p > 0.05), but analyzes showed an acceptable to medium effect size for both scales (d = 0.3-0.6.). The State Trait Anxiety Inventory for Children (STAIC) is a 20-item self-report scale to assess the severity of anxiety in children (Spielberger et al., 1973). A marginally significant difference between the mean global scores of the STAIC questionnaire before (M= 39.83; SD= 6.05) and after (M=36.50; SD= 5.54) the program (p = 0.06) was obtained with a high effect size (d = 0.74).
Conclusions:

Based on the effect size coefficients, the results suggest that yoga helps children with ASD to manage their anxiety symptoms and improve their QoL at school. The results demonstrate acceptable to large effect sizes. Therefore, the small sample size may have reduced statistical power, which would explain why the results are not statistically significant.

435.271 (Poster) The Effects of a School-Based Group Music-Making Program on Engagement Behaviors of Adolescents on the Autism Spectrum
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Background:

Autistic adolescents respond well to music therapy and intervention, given their strong musical strengths, interests and abilities in music. Consequently, music interventions are considered strength-based interventions as they shift the focus away from a deficit approach by highlighting the person’s unique set of qualities, strengths and interests. Music interventions are usually performed in one-on-one settings and are associated with significant costs. Moreover, one-on-one settings do not allow for the assessment of “on-task behaviours” in a group (e.g. following along with peers), which are proxies for engagement and are necessary to foster appropriate learning, the development of student-teacher relationships and adhering to social rules.

Objectives:

Thus, this study aimed to investigate the engagement of autistic students during a school-based group music-making program, as measured by observable on-task behaviours, to assess if findings from studies in one-on-one settings hold true in a group setting. We also aimed to explore if potential changes in engagement during the musical activities (e.g. playing percussions) would generalize to non-musical activities (e.g. the warm-up).

Methods:

A music program, implemented by the community organization ÉducaTED, was conducted over a period of 11 weeks in a high school setting with autistic students (N=10) from 12 to 17 years old. All sessions of the music program were recorded, allowing for behavioural data coding of on-task behaviours.

Results:

There was a high initial engagement for the musical activity (M=.87, SD=.12) and non-musical activity (M=.75, SD=.16) respectively at the first session, which remained high throughout the program until the last session for the musical activity (M=.91, SD=.08), but not for the non-musical activity (M=.58, SD=.30). Paired-sample T-tests were conducted and also showed more on-task behaviours during the musical compared to the non-musical activity throughout the duration of the music program. Further, we conducted a homogeneity of regression assumption test which was violated (p=.046) thus revealing that the slope coefficients between the musical activity and warm-up were significantly different. This suggested that there were continuously more on-task behaviours within the musical activity compared to the non-musical activity.

Conclusions:

Our results indicate that autistic students show high and continuous engagement in group-based musical activities. In contrast to individual instruction, group-based music programs can benefit a greater population by increasing accessibility to music-based interventions. Group-based music programs could be implemented in the adapted educational curriculum for students with special needs, which is lacking in arts education.

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Background:
Mealtimes are often a significant source of stress for families with autistic children (Anderson et al., 2012; Curtin et al., 2015; DeGrace, 2004; Marquenie et al., 2011; Postorino et al., 2015; Thullen & Bonsall, 2017). Yet, there have been very few empirical evaluations of parent education and training programs regarding family mealtimes (Sharp et al., 2013).

Objectives:

This project examined the feasibility and efficacy of an online toolkit, Mealtimes on the Spectrum (https://www.mealtimesonthespectrum.org/), for supporting parents with family meals. Mealtimes on the Spectrum uses a relational feeding model (Satter, 2005) which promotes self-regulation of eating behavior and is based on observations of family meals, interviews with parents, and interviews with autistic children. An advisory board of autistic adults reviewed the toolkit and consulted on the research.

Methods:

This study was approved through the institutional review board (IRB) at the author’s university and funded by an internal grant. Parents of autistic children (N=135) were recruited through autism parent support groups. Once registered, they completed a pre-test and were randomized into intervention or a waitlist control group. The intervention group received weekly emails with content from the online toolkit for eight weeks. After this period, both groups were sent a post-test. Upon completion, the control group got access to the toolkit, and both groups received a $40 Amazon gift card (N=112). See table 1 for demographic information. To examine the efficacy of the toolkit, we conducted a repeated measures analysis of variance (ANOVA) with intervention or control group as a between-subjects factor. We used (1) the Comprehensive Feeding Practices Questionnaire (CFPQ; Musher-Eizenman & Holub, 2007): a 49-item questionnaire about parent feeding practices, and (2) the Positive Affect Index (PAI; Bengtson, 1973): a 15-item measure of a parent’s affect toward their child. To examine the feasibility, we explored toolkit use and satisfaction.

Results:

Regarding initial efficacy, table 2 summarizes the results of the repeated measures ANOVA with group as the between-subjects factor. There were expected outcomes for many of the sub-scales of the CFPQ and PAI with small effect sizes. Regarding feasibility, most participants assigned to the intervention group opened the emails each week (M = 6.81, SD = 1.59). Of those in the intervention group, 64% found the emails helpful and learned new information; however, 79% felt they needed more support to make their mealtimes successful.

Conclusions:

The initial exploration of the efficacy and feasibility of the online toolkit, Mealtimes on the Spectrum, shows preliminary indicators that the toolkit can be useful for families. Autistic children are at increased risk for being overweight or obese compared to their non-disabled peers (Broder-Fingert & Van Cleave, 2014). Thus even small improvements in parents’ mealtime behavior, such as decreasing pressure to eat, are important improvements. The small effect sizes coupled with the parent feedback suggest families need a more intensive intervention. Given that families have a difficult time receiving any information in this area, Mealtimes on the Spectrum may be a useful resource.
Overall, 12 autistic youth (11 males; 1 female) with an IQ > 70 aged 15 to 25 years (mean=18.92 years; SD=2.43) participated in the feasibility study, with 11 attending the program and completing pre and post-test assessments. Allied health professionals from Therapy Focus delivered the program over 20 weeks, commencing with a 90-minute individual goal-setting session followed by eight 90-minute group sessions and eleven 15-minute individual mentoring sessions. A pre and post-test design was used to assess whether the program changed the participants’ adaptive functioning scores, as assessed by the Adaptive Behavior Assessment System, Third Edition (ABAS-3). Focus groups were conducted post-completion of the program to capture the views of the participants and clinicians regarding the acceptability of the Tele-TRANSITION® and analysed using thematic analysis.

Results: Normality tests indicated a normal distribution of the data. Findings from the t-test demonstrated significant improvements under the leisure (p = .02) and social (p =.03) domains of ABAS-3, with large effect sizes (Cohen’s d) of 0.90 (leisure) and 0.84 (social). Findings from the thematic analysis indicated overall satisfaction with the online delivery format and the program’s content, citing group discussions and sharing experiences with other members as an important learning strategy. Autistic youth believed that working individually with a clinician was beneficial for achieving their goals set for the program. Despite their satisfaction with the program, both clinicians and participants expressed a need for further modifications, such as increasing individual mentoring sessions’ time, using resources that facilitate group discussions and ideas for warm-up activities for group meetings.

Conclusions: The results of this study demonstrate the feasibility and acceptability of the Tele-TRANSITION® program in improving daily living skills for adulthood for Australian autistic youth. The results also indicate the need to evaluate Tele-TRANSITION® in a more rigorous study design to explore its efficacy.

435.274 (Poster) The Italian Validation of the Social Skills Program PEERS® in Adolescents with Autism Spectrum Disorders (ASD): A Randomized Controlled Trial during COVID-19


Background: Social difficulties are a lifespan characteristic of the autism spectrum disorder (ASD), targeted in interventions for preschoolers and children, while evidence of their effectiveness in adolescents is lacking. The Program for the Education and Enrichment of Relational Skills (PEERS®) is an internationally recognized parent-assisted program on social skills, but in Italy there is no validated adaptation of this specific intervention.

Objectives: A two-arm Randomized Controlled Trial to evaluate the effectiveness of the PEERS® intervention in the Italian context was conducted.

Methods: The study was conducted according to CONSORT guidelines (Schulz et al., 2010) and registered in Clinical Trial (NCT05473104) (Figure 1). Adolescents with ASD (Level 1) were recruited through national stakeholders and public clinical services. Participants were randomly assigned to two groups stratified by gender and age: the experimental group (TG), attending training immediately, and the delay treatment group (WL), which participated after 14 weeks. Evaluation of primary (social abilities) and secondary outcomes (co-occurring conditions, executive functions) (Figure 2) was performed at 4 time-points: T0 (baseline), T1 (TG post-intervention and WL second baseline), T2 (TG follow-up and WL post-intervention), T3 (WL follow-up). A total of 99 teleconference interviews were conducted by an expert clinician, and 55 participants were excluded. Due to COVID-19, PEERS® training was delivered via telehealth (January-July 2021) and only questionnaires to multi-informant assessors (adolescents, parents, and teachers) were collected. No differences were found at T0 between TG and WL groups in baseline characteristics and primary outcomes. Significant groups differences emerged instead between T0 vs. T1 on primary (TASSK-R, F(1,22) = 40.79, p < .001, ηp² = .65; QSQ-Social Initiative Scale parent version z = -3.412, p < .001; adolescent version z = -3.086, p = .002) and secondary outcomes (BRIEF-2 Emotion Regulation Index, F(1,22) = 15.20, p < .001, ηp² = .41). To test additional treatment-related effects, we evaluated the changes in overall group (TG+WL) among pre- and post-intervention, and follow-up. Further changes from pre- to post-intervention emerged in secondary outcomes -(BRIEF-2 Global Executive Composite Score; CBCL-Youth version internalizing, externalizing, total problems; CDI-2 Functional Problems). All the improvements detected in post-treatment were also maintained at a 3-months follow-up.

Conclusions: The efficacy of the Italian version of PEERS®— with minor changes to the original content's program – was ascertained on primary and secondary outcomes. Innovative findings on emotion regulation and depression symptoms have also emerged. Study limitations are due to blinding outcome assessors' bias and the absence of qualitative measures. Future studies should confirm the PEERS®
efficacy in community settings with traditional administration methods.

435.275  *(Poster)* The Role of Alexithymia in Mental Health Functioning and Cognitive Treatment Strategies Among Autistic Adults

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**Background:**

Autistic adults experience high rates of co-occurring anxiety and depression, although there is limited research on mental health interventions for this population. Currently, the most utilized therapeutic approach for autistic adults is cognitive-behavioral therapy (CBT), which includes cognitive strategies that require identifying and understanding emotions and thoughts. Given the heterogeneity of ASD, it is crucial to consider individual differences, such as alexithymia, that may make some strategies challenging to implement. Prior research indicates that alexithymia (difficulty identifying and describing emotions) may be heightened in the autism population and associated with higher rates of anxiety and depression. Research is needed to better understand the role that alexithymia may play for autistic adults in mental health outcomes and implementation of therapeutic strategies.

**Objectives:**

The current study investigated associations between alexithymia and mental health conditions (depression and anxiety), as well as the use of cognitive therapy strategies within an autistic adult sample.

**Methods:**

The sample included 303 autistic adults 21-77 years of age (M = 37.1; 49.5% cis female) who were recruited via the Simons Foundation Powering Autism Research for Knowledge (SPARK) Research Match process. Participants completed a demographic survey, the AQ-Short, the TAS-20 to measure alexithymia, and the PHQ to assess depression and anxiety. Autistic adults provided ratings for ease of use (1=very difficult, to 5=very easy) for cognitive mental health strategies (i.e., paying attention to thoughts, identifying, and challenging/reframing negative thoughts). Separate linear regressions were conducted with alexithymia predicting depression and anxiety as outcomes. An ordinal logistic regression model was run with alexithymia as the predictor and perceived ease of using cognitive strategies as the outcome. Age, gender identity, race, and autism characteristics were included as covariates in all models.

**Results:**

Approximately half of the sample (48.8%) met the clinical cut-off for alexithymia (score≥61). Accounting for other model covariates, results revealed that age (B=-.19, p<.001) was negatively associated with anxiety, while AQ Total Score (B=.13, p=.038) and alexithymia (B=.27, p<.001) were positively associated with anxiety. Findings also indicated that age (B=.13, p=.023) was negatively associated, while alexithymia (B=.28, p<.001) was positively associated, with depression. For the final analysis, approximate likelihood-ratio test indicated that the proportional odds assumption was met. Results found a significant negative relationship between alexithymia and perceived ease of using cognitive strategies in therapy (B=-.03, p=.015).

**Conclusions:**

Consistent with prior research regarding the prevalence of alexithymia (49.93% in the autism population vs. 4.89% in the general population), findings revealed that approximately half of the autistic adults in the sample reported clinical-level alexithymia. Results indicated that difficulty accurately identifying and describing one’s emotions is associated with mental health outcomes (i.e., higher levels of co-occurring anxiety and depression) and greater difficulty with using cognitive mental health strategies. Given that CBT is the most common mental health intervention for autistic adults, it is crucial to consider the presence of alexithymia, and the potential integration of specific strategies addressing emotional recognition, when implementing and individualizing therapeutic techniques.

435.276  *(Poster)* The Role of Organizational Climate and Teacher Stress in Predicting Attitudes Towards Evidence-Based Practices and Implementation Outcomes of School-Based Facing Your Fears

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Background: Autistic children with anxiety have difficulty accessing evidence-based practices (EBPs) due to long wait lists and lack of trained providers (Elkins et al. 2011). Fortunately, interdisciplinary school providers (ISPs) can be trained to deliver mental health EBPs like Facing Your Fears-School Based (FYF-SB) to autistic students with anxiety with good success (Reaven et al. 2021). However, there is little information regarding the implementation of EBPs in schools for autistic youth. Examining provider and organizational factors may clarify the adoption and eventual sustainment of mental health interventions within schools. The purpose of this study is to examine the association of provider and organizational factors with provider attitudes of EBPs and perceptions of FYF-SB following program delivery.

Objectives: To determine the extent to which provider factors (stress) and organizational climate impact provider attitudes towards EBPs and provider perceptions of acceptability and appropriateness of FYF-SB.

Methods: Seventy-seven ISPs (91% female; 4% Latinx; 91% White; 59% non-mental health professionals) from 27 school teams across 3 school districts were trained to deliver FYF-SB to autistic students, ages 8-14, with anxiety. Prior to training, ISPs completed the Teacher Stress Inventory (TSI; Fimian & Fasteneau, 1990); the Organizational Climate Measure (OCM: Patterson et al. 2005); and the Evidence-Based Practices Attitudes Scale (EPAS: Aarons, 2004). After implementing FYF-SB, ISPs completed an implementation survey examining perceived appropriateness and acceptability of FYF-SB. We first examined intraclass correlations to evaluate the nested structure of the data. ISP attitudes toward EBPs, collected pre-training, did not indicate a need for multilevel data structure, therefore we used multiple regression to analyze this outcome. Perceived acceptability (ICC = .43) and appropriateness (ICC = .29) were more similar within school teams than between school teams and were therefore analyzed using multilevel models.

Results: Results for models predicting attitudes toward EBPs are presented in Table 1, and models predicting implementation outcomes are presented in Table 2. ISPs with greater concerns related to student discipline and motivation self-reported that EBPs were less appealing, but they would use them if required. Yet, post-training, ISPs with more concerns regarding student discipline and motivation reported higher levels of FYF-SB acceptability. Provider stress around time management and other work-related stressors were associated with lower self-reported adoption if required and lower acceptability, respectively. Providers reporting high levels of organizational pressure to produce reported more positive attitudes toward EBPs.

Conclusions: Results suggest that teacher stress and organizational climate are related to EBP attitudes and perceived acceptability of an EBP (FYF-SB), which has implications for eventual adoption and sustainment of mental health EBPs in school settings. For example, ISPs with concerns about classroom management were reluctant to try a new EBP but they found FYF-SB to be a good fit for their student need once they tried it. Additionally, work-related stressors were associated with lower treatment acceptability. These results suggest that pre-implementation strategies focused on supporting time management and workplace stressors, as well as student discipline and motivation, may enhance receptivity to EBPs. Limitations and future directions will be discussed.


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Background: SAS is an innovative, evidence-based therapy programme for children with emotional regulation and social communication difficulties (Beaumont & Sofronoff, 2008). It uses interactive technology as well as home, school and clinic interventions in a child centered, espionage themed package. Based on the principles of Cognitive Behaviour Therapy, SAS teaches children how to identify and cope with their emotions and how to understand and manage social interaction. SAS was originally developed for children with autism and has a robust published evidence base for this client group across university clinics and schools in Australia, America and Canada. It has been shown to effect clinically significant changes in the social-emotional skills of children with a range of other neurodevelopmental disorders. However, no published evidence currently exists for the use of SAS for children with moderate-severe mental health disorders attending community CAMHS.

Objectives: To evaluate the efficacy of the SAS programme up to 6 months post intervention in an Irish outpatient community CAMHS.

Methods: 51 children (30 boys, 21 girls) aged 8-12 years (mean age 10:11) with moderate-severe mental health disorders completed the 14-week programme within their local CAMHS clinic. Children presented with complex diagnostic profiles including autism and/or Attention Deficit Hyperactivity Disorder and/or Anxiety Disorder. Autism was the most common diagnosis (59%). Children attended nine weekly group sessions and completed the SAS computer game at home. Parents attended four, two-hour training sessions. Children's teachers attended a two-hour information session and received weekly teacher tip sheets. Children and parents then attended 3 and 6 month follow-up sessions. Questionnaires were completed by children, their parents (51 mothers, 45 fathers) and teachers at baseline, post-treatment and at 3 and 6 month follow up. Quantitative analysis was employed to evaluate the overall treatment effect.

Results: Statistically significant improvements were made in children’s social communication ($F(1.558, 15.581) = 6.552, P = 0.012$) and emotional regulation skills ($F(1.331, 14.645) = 9.213, P = 0.005$) across home and school settings. Children’s knowledge of emotional regulation strategies also significantly improved. Treatment gains were maintained up to 6 months post intervention. 75% of both parents
and teachers reported lasting changes in children’s skills and behaviour at the 6-month time point. Qualitative feedback highlighted clinically significant change in children’s emotional regulation, including reduced aggression and/or anxiety and improvements in children’s mood and self-esteem.

**Conclusions:** This study extends the existing international evidence base for SAS by examining its effectiveness in community CAMHS clinics in Ireland. SAS allows children with complex diagnostic profiles, especially those with a diagnosis of autism, to access an evidence-based treatment that develops social-emotional resilience, thereby potentially preventing escalation of difficulties into adolescence. Incorporation of SAS into a child’s multi-disciplinary care plan has the potential to enhance overall mental health treatment outcomes.

435.278 (*Poster*) Thinking Together the Neurodiversity Paradigm and Autism Care Practices


**Background:**

The field of autism research and practice finds itself amidst structural change. Neurodiversity proponents and their allies increasingly challenge the conventional, medical approach to autism. Rather than focussing on deficits, they claim autism is an expression of neurodiversity. Rather than limiting autistic challenges to the boundaries of the individual, they point to social and societal contexts as potentially enabling or disabling for autistic people. Rather than staying side-lined, autistic people demand their place at the discussion table. Against the backdrop of this reconceptualization of autism, researchers and caregivers are confronted with the question of how good and just autism care could look like in the age of neurodiversity. How can caregivers support autistic people and their relatives with the actual problems they experience without pathologizing autism as such? How can individual interactions in caring practices contribute to the political demand of societal change which neurodiversity proponents call for? How can expertise built on lived experiences find its place alongside professional expertise of (non-autistic) caregivers?

**Objectives:**

In this study we conducted an ethical analysis of autism care to propose a groundwork for ‘neurodiversity-affirmative autism care’.

**Methods:**

Our methodological approach was grounded in feminist bioethics. We reinterpreted the feminist bioethical conceptualization of ‘vulnerability’ in a neurodiversity-sensitive way to critically analyze current autism care practices and constructively propose alternatives.

**Results:**

Feminist interpretations of vulnerability point to both universal and political dimensions of this concept. All children, irrespective of their neurotype, have ongoing biological, psychological and social needs. The ever-present risk of unmet needs, underscores vulnerability as a universal phenomenon. Vulnerability’s universal dimension helps to destabilize the borders between neurotypical and neurodivergent children. This way, mobilizing vulnerability offers moral grounds for solidarity and a shared responsibility to help meet each other’s needs, instead of viewing support measures as costly, burdensome accommodations or “special needs”. Of course, vulnerability is not experienced equally. Vulnerability ties in with existing power dynamics and can even be worsened in the process of “protecting the vulnerable”. Growing up in a neurotypical-dominated society, autistic children experience more physical and mental health issues, their environments risk being less adapted to foster healthy, autistic development, and some strictly behavioral or alternative interventions are even considered harmful, rather than helpful for autistic children. Political dimensions of vulnerability offer grounds for the structural empowerment of neurodivergent children and their caregivers through emancipating, instead of patronizing care practices.

**Conclusions:**

The neurodiversity paradigm is not incompatible with autism care practices. Our analysis rather shows that care can be considered a political activity with the potential to contribute to social change advocated for by neurodiversity proponents. We propose the principles of solidarity and empowerment as key ethical foundations for neurodiversity-affirmative autism care and provide practical examples on how to apply these principles in practice.

435.279 (*Poster*) Treatment Engagement As a Predictor of Therapy Outcome Following Cognitive Behaviour Therapy for Autistic Children
Background: Autistic children often experience mental health challenges that can sometimes be addressed with cognitive behaviour therapy (CBT); however, some children who take part in CBT do not show clinically meaningful improvement at the end of treatment. Focusing on the nuances of the therapeutic process may help to identify addressable and modifiable factors that contribute to variation in treatment success. Active engagement in one’s therapy is a key contributor to successful outcomes, yet research on child engagement in cognitive behaviour therapy (CBT) has largely focused on youth without autism.

Objectives: To examine multiple indicators of child engagement in relation to outcomes for autistic children who took part in CBT for emotion regulation.

Methods: A within-subject longitudinal design was used to assess treatment engagement over the course of therapy, in relation to outcomes. Data were collected from 60 autistic children who were between 8 and 13 years of age (86.7% male; $M_{age} = 9.58$ years, $SD = 1.44$ years; 75% White). Indicators of child engagement included independent observer ratings of in-session involvement (ISI), as measured by the Child Involvement Rating Scale (Chu & Kendall, 1999), and therapist ratings of the therapeutic relationship and homework completion using single-item post-session measures. Indicators of engagement were measured at early (i.e., first third), middle (i.e., mid third), and late (i.e., final third) stages of treatment. Parent-reported emotion regulation was the primary treatment outcome, as measured by the Lability/Negativity and Emotion Regulation subscales of the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997). Multiple linear regressions were computed to assess whether indicators of child engagement predicted treatment response, after controlling for baseline levels of emotion regulation.

Results: After controlling for baseline levels, mid-stage and late-stage engagement significantly predicted post-treatment ERC Lability/Negativity scores. Mid-stage ISI uniquely accounted for 5.76% of variance in post-treatment ERC Lability/Negativity. Late-stage ISI was trending as a unique predictor of post-treatment ERC Lability/Negativity, accounting for 3.61% of variance. Overall, early child engagement did not significantly predict post-treatment ERC Lability/Negativity, but early-stage ISI was trending as a predictor of post-treatment ERC Lability/Negativity, accounting for 3.24% of unique variance. After controlling for baseline levels, post-treatment ERC Emotion Regulation was not significantly predicted by early-stage, mid-stage, or late-stage overall engagement. Approximately 4.41% of variance in post-treatment ERC Emotion Regulation was uniquely accounted for by early-stage ISI.

Conclusions: Treatment engagement is a fundamental consideration in determining whether autistic children will benefit from CBT. Child in-session involvement throughout therapy may be particularly relevant for treatment change. The therapeutic relationship and homework completion should continue to be considered and evaluated in relation to treatment outcomes to better understand the relevance of these factors in CBT for autistic youth. Future research should aim to operationalize and assess treatment engagement in a consistent way to allow for replication and comparability of findings across studies. Addressing issues related to in-session involvement early in treatment would likely be beneficial for promoting positive engagement from autistic clients for the remainder of therapy, in turn increasing the likelihood of therapeutic success.

Background: Autistic individuals commonly exhibit executive function (EF) deficits which influence functioning in a variety of domains (Pellicano et al., 2012). Recent research has supported the efficacy of an online executive function program, e-Unstuck and On Target Course for Parents (Cannon et al., 2018; Kenworthy et al., 2014), in improving children’s EF abilities and reducing parental strain (Kenworthy et al., 2022). A hybrid delivery model, combining the e-Unstuck and On Target Course with group-based clinician coaching, has shown success in other intervention programs but has yet to be studied in this context (Taylor et al., 2008).

Objectives: The present study aimed to explore the subjective experiences of parents participating in a virtual coaching program while completing an online executive function program.

Methods: Fifteen parents (2 fathers, 13 mothers) of autistic children aged 5-14 years participated in a virtual coaching program while completing the e-Unstuck and On Target Course. Parents completed online modules and attended weekly, telehealth coaching sessions for a duration of nine weeks. At the mid- and endpoint of the program, parents completed surveys to assess acceptability and program satisfaction. Participants responded to the following open-ended questions: “Please describe what you enjoyed most about these modules;”, “Please describe what you have enjoyed most about the coaching group;”, and “If I could, I would change (BLANK) about the program.”

Results: Parents’ open-ended survey responses suggested that the modules provided them a new perspective from which to approach their child’s EF challenges (60% responses) as well as new skills (63% responses) or language (17% responses) to implement. Other notable themes related to the interactive and engaging nature of the modules. Importantly, a prominent theme within the coaching group responses were related to the opportunity for parents to learn from other parents (80% responses). Many parents enjoyed learning about others’
experiences and the skills other parents implement. Relatedly, responses commonly included phrases such as “knowing I’m not alone”, “feel less isolated”, “similar struggles”, and “same challenges”. When asked what they would change about the program, 50% of parents reported that they would not change anything. Commonly reported other themes were related to extending the coaching group length and the time between sessions for skill practice, as well as interest in added coaching group components (e.g., general time to “connect” with other parents, specific recommendation requests).

Conclusions: Parent responses indicate a high level of satisfaction with the virtual coaching group and online executive function modules. Survey results suggest parental satisfaction with the perspectives, skills, and language provided by the modules. Moreover, the modules are reported to be engaging and enjoyable for parents to watch. Responses related to the coaching group provide insight into a fortuitous consequence of the program, one which likely would have been missed by traditional outcome measures. Specifically, many parents report gaining a sense of community and support from other parents. Combined, findings point to the importance of understanding subjective experiences of parents when assessing the acceptability and feasibility of parent-mediated interventions, as they may likely fall outside of the bounds of traditional outcome measures.

435.281 (Poster) Understanding the Impact of an Inclusive Maker Program: Engineering Design Process Thinking and Teacher Reflections


Background: Hands-on making involves participants in the engineering design process (EDP) where students learn to identify a problem, brainstorm, plan, make, test, improve, and finalize projects (Halverson & Peppler, 2018). EDP skills are valued in formal and informal education and workforce settings (Martin & Dixon, 2016). Although autistic youth often have deep interests in STEM (South et al., 2015), autistic adults often have difficulty entering the STEM workforce (Shattuck et al., 2012). To address these needs, a multidisciplinary team created the Inventing, Designing, and Engineering for All Students (IDEAS) Maker Program.

Objectives: Evaluate the impact of IDEAS on EDP understanding using pre- and post-test assessments and teacher surveys.

Methods: IDEAS was an out-of-school club for students at six autism-inclusion middle and high schools in 2021-22. Pre- and post-assessments included a two-question, spoken-response EDP assessment administered via Zoom (Hsu et al., 2012). Students were asked what they thought about a process depicted in a cartoon diagram and how they might do it differently. Responses were coded on a three-point scale across EDP domains (0 = no evidence noted, 1 = evidence noted, and 2 = evidence noted and elaborated).

Fifty-five weekly post-club surveys were collected from ten teachers across six sites. Surveys included closed-ended prompts to assess perceptions of student gains in various areas on a scale from 1 (strongly disagree) to 5 (strongly agree). Teachers also answered open-ended prompts about student engagement and growth.

Results: Thirty-eight students (25 middle and 13 high school) completed assessments. Results showed significant pre-test ($M = 2.50, SD = 1.61$) to post-test ($M = 4.05, SD = 1.64$) gains on summed EDP assessment scores (Figure 1). We observed a trend of fewer students receiving a “0” and more students receiving a “1” or a “2” on all items. Pre- to post-test differences across individual items were statistically significant for the Plan, Improve, and Test domains. Significantly fewer students failed to note the Plan (29% fewer, $p<.001$) or Test (26% fewer, $p<.05$) domains and significantly more students elaborated on the Plan and Improve domains at post-test (13% more, each; $ps <.001$).

When asked if they felt their students improved their EDP skills after participating, the majority of teachers strongly agreed or agreed (83.9%). When asked if their students made social connections at maker club, 91.1% of teachers strongly agreed or agreed. Open-ended responses yielded valuable insight for the team’s understanding of how students pursued their interests and connected with others while participating in IDEAS (Table 1).

Conclusions:

Assessments suggest the positive impact of IDEAS on students’ understanding of the EDP. Teacher surveys indicate that educators feel students gained social and EDP skills after completing IDEAS, demonstrating its utility in teaching these skills across a variety of age groups. Creating products based on interests can help students draw connections to the larger world and gain skills that may lead to higher education and career pathways. For educators interested in pathways to improve student STEM skills and social outcomes, results indicate that making may offer students these opportunities.

435.282 (Poster) “There Is a Lot of People like Me” : Virtual Social Skills Groups Based on Special Interest for Autistic Adolescents and Young Adults.
Evidence based social skills (SSI) interventions for autistic adolescents and young adults are very limited, this population can be isolated, and might have a hard time finding their tribe. Additionally there is very few strength and special interest based approaches in autism. Due to COVID-19 pandemic social isolation became even more challenging for this population and our sample population was very limited in their social life for a long period of time due to restrictions.

Objectives:

In this pilot we designed a 9 month weekly virtual intervention of conversational skills and problem solving intervention based on special interests: Art /Photography and Manga/Anime for autistic adolescents and Young adults without intellectual disability. The aim of the project was to design and pilot a SSI virtually adjusting intervention to the COVID pandemic limitations.

Methods:

The pilot had two groups of participants of 6 individuals each, (N 12, gender: 7 females, 5 males 1 non binary) from 15 (N 2) to 25 years. The Art and Photography Group was only females. The session was an hour long, and the conversation would start about the special interest selected and turn into more spontaneous conversation. We designed special conversation activities based on Art and photography for one group and Manga and Animé for the other. We would use different instructional cognitive behavior methodologies including some lessons from PEERS Young Adults (Bi-directional Conversation, Managing Disagreements, Teasing and Bullying, Finding Friends) as well. To measure outcomes we design two questionnaires for participants (N 12) and for families (N 12) for some variables in a 5 point Likert scale and compared the results and also qualitative questions about the experience. We analyzed the preliminary quantitative descriptive data in this pilot.

Results:

The motivation was high for participants (75% almost always motivated), and also perceived by families (41% almost always motivated), initiation of conversation, reciprocity and problem solving did improve for an important number of participants (58,53%, 72,7% 58%) and was also perceived by parents (58,3%, 66,7% 81%), benefits of the intervention was also high perceived by participants (50% very, 41,7% some) and families (66,7% very, 25% some) 75% of participants made new friends, and all of them of them said they expanded their social circle and social life even during pandemic times.

Conclusions:

In spite of the small size of the sample and limited methodology, preliminary results for participants and their families reported improvement in key areas for socialization in the virtual pilot. Available evidence based techniques from PEERS A/YA might be useful also in this kind of groups. Moreover, the results suggest that virtual interventions to connect people through their special interest might be a promissory and novel way of working social skills as well as connecting autistic individuals and their passions, in order to find out like one of our participants said "there is a lot of people like me".

435.283 (Poster) Virtual Reality Police Safety Teletherapy Intervention: Results of a Randomized Controlled Trial


Background: Up to 20% of autistic individuals will be stopped and questioned by police before their early twenties (Rava et al., 2016). Providing opportunities to practice police encounters is essential; police interactions are unexpected, challenging, include unusual sensory stimulation, require novel problem solving, and necessitate rapidly processing social situations in real time (Channon et al., 2001; Salerno-Ferraro & Schuller, 2020; Vanmarcke et al., 2016). Considering that up to half of officers do not receive autism training, preparation on the part of autistic individuals can support smooth interactions (Christiansen, Minich, & Clark, 2021). Immersive virtual reality (VR) affords individuals the opportunity to practice interacting with police officers in a safe, simulated environment. VR practice can also be administered via teletherapy, providing an accessible, adaptable tool for home use. In this study, we outline preliminary efficacy analysis of an immersive, virtually administered VR-based intervention, the Floreo Police Safety Module (PSM).
Objectives: Evaluate the efficacy of a virtually administered VR-based intervention by assessing masked behavioral ratings of immersive, simulated police interactions.

Methods: Thirty verbally fluent autistic adolescents and adults were randomly assigned to either an immersive VR-based intervention (Floreo PSM) or no intervention group. All participants underwent three VR-based assessments of virtual police officer interactions and completed online surveys about their knowledge of and experiences with police at three timepoints (pre- and post-intervention, and follow-up). Individuals in the intervention group received three 30-minute sessions of intervention. Assessments and the viewpoint inside the VR were recorded. All aspects of the study were virtually administered (participants at home). Interactions were recorded and scored in 15-second segments. Each segment was double-coded for: appropriateness of verbal response, orienting behavior, fidgeting behavior, and overall behavior. Scores were averaged across each behavioral category and compared at each timepoint. Kappa coefficients were in the fair-to-moderate range. The final sample is currently being coded and will consist of 48 participants (24 in each condition), with pre-/post-assessments and a follow-up assessment evaluating key skills.

Results: Preliminary analysis suggests positive impact of the immersive VR intervention. Linear mixed effects regression revealed significant main effects of time (pre-/post-intervention) on ratings of orienting behavior (estimate: 0.22, t=2.10, p=.04) and appropriate verbal response (estimate: 0.14, t=2.30, p=.02). Pre-planned pairwise comparisons of Tukey-corrected estimated marginal means revealed that the effects of time for appropriate response were driven by improved scores in the intervention condition (p=.001). Tukey-corrected estimated marginal means revealed significant improvements from pre- to post-intervention in the intervention condition as compared to no intervention on two out of four variables (Figure a-d).

Conclusions: Preliminary results indicate that teletherapy-delivered VR holds potential as a comfortable, motivating, and effective platform for autistic people to safely practice interacting with police officers. Data collection is complete, and analysis of all participants will be completed before May 2023, offering further insight into the efficacy of VR-based teletherapy intervention.

435.284  (Poster) Strengths-Based Programs Participation for Autistic Adolescents: ‘What Matters?’

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Background: ‘Disability’ according to the social model is the interaction between a person’s physical or mental traits and their environment. The social model advocates for removing social and environmental barriers to impairments and focuses on the abilities and strengths of an individual. Over the last decade, prompted by the neurodiversity movement, there has been wide recognition of the strengths of autistic individuals and a need for strengths-based approaches. In Western Australia, community strengths-based programs are delivered through the Autism Academy for Software Quality Assurance (AASQA) and Spectrum Space (formerly Autism West) aiming to develop the interests of autistic adolescents aged 10 to 18 years in Science, Technology, Engineering, Arts, and Mathematics (STEAM).

Both providers deliver a range of STEAM activities including coding, Lego Robotics, Arduino, Nao Robotics, mathematics, visual arts, music, and digital media in a supportive group environment. Recent studies have reported that strength-based programs that target autistic adolescents’ strengths, harnessing their skills, knowledge, and interests in a supported environment could promote promising outcomes in the transition to adulthood, however, little is known regarding the factors that influence their participation in strengths-based programs.

Objectives: This study explored the factors that influence autistic adolescents’ participation in community strengths-based programs designed to develop their interests and skills in STEAM from the parents’ perspectives.

Methods: A repeated cross-sectional design using an online survey was conducted over three consecutive years. Participants were parents of autistic adolescents who had participated in the strengths-based program at AASQA or Spectrum Space for more than one school term (approximately 10 weeks). Factors influencing participation were explored from the open-ended questions that captured the parents’ perception of the impact of the program on the domains of health and well-being, social relationships and interactions, confidence and self-esteem, sense of belonging, activities, and participation. In total, 52 parents responded in 2018 and 2019, and 40 in 2020. Data were analysed using directed content analysis based on the International Classification of Functioning, Disability and Health (ICF) and supplemented by the personal factors proposed by Grotkamp and colleagues that are not included in the ICF. Based on the frameworks, responses were coded in reference to the ICF concepts of body functions and structures, activities and participation, and contextual (personal and environmental factors).

Results: We found that both personal-related and external factors, acting as facilitators and barriers, influence autistic adolescents’ participation in community strengths-based programs. The personal-related factors included the participants’ enthusiasm towards the program and self-perception while the external factors included the learning environment, the program approach, and the mentors’ attitudes.
Conclusions: While further research is needed, five key elements from internal and external factors including participants’ enthusiasm towards the program; participants’ self-perception; the learning environment; the program approach; and the attitudes of the mentors appeared to underpin successful participation in the community strengths-based programs. The findings could provide a framework that may underpin future community strengths-based programs.

435.285 (Poster) ‘I Made a New Friend Today and I Was so Happy’: Experience of Autistic Young People Participating in Life Skills Programs

Background: Many autistic people experience significant difficulties with everyday life skills. Compromised life skills can lead to marginalisation, social exclusion, disengagement with the community, and dependence on others. Everyday life skills are essential for independent living and community participation. However, limited autism friendly programs are available to successfully support autistic people to learn and gain life skills.

Objectives: This study investigated the experience of autistic young adults who participated in a series of life skills programs which were delivered through a strength-based approach. Three domains were included and evaluated; Daily Living Skills, Positive Relationships, and Money Skills. The learning content and its applicability to real life were explored as well as the perceived qualities of the program facilitators and program activities.

Methods: A qualitative study with one-on-one interviews and focus groups to explore the perceived value of the life skills program was conducted. The program was co-designed with participants focussing on three key life domains as mentioned above that are in line with the National Disability Insurance Scheme (NDIS) domains in Australia. The duration of the program was 10 weeks for each domain. Forty-five young autistic adults (Mage = 22, SD=3.7, 58% male) participated in the study. Thematic analysis was used to analyse the data.

Results: The results of the life skills program show positive outcomes across all three domains. Participants felt more confident in their ability to apply the learned skills in their life and reported improvements in daily living skills, relationship skills, and money handling skills. In the Daily Living Skills program participants described improvements in their active listening skills, home management skills, personal care, and clothing etiquette. Additionally, knowledge was gained in safe food handling, kitchen incident prevention, and nutrition. Numerous new and improved skills were also reported from attending the Positive Relationship Skills program including improved communication skills, a reduction in stress, more confidence in communicating with family and friends, maintaining relationships, and increased confidence to go on a date. Furthermore, new friendships were forged among the participants. Participants learned about budgeting and consequently reported saving money from the Money Skill Program. Notably, the program helped them to pay their bills on time and extended their knowledge of tax and superannuation. Participants were happy with the support they received from the facilitators who were inclusive, patient, and responsive. Lastly, most participants found the program activities useful (e.g., group discussions, role-play activities, worksheets, self-reflection, and videos).

Conclusions: This study highlights the positive impact of the life skills program on participants’ daily living skills, relationships skills, communication skills, self-confidence, and financial responsibilities. The outcomes of this program not only provide evidence that life skills can be taught but also show that participants are able to apply these skills to improve important areas in their life, increasing independence at home and in the community.

435.286 (Poster) Non-Pharmacological Interventions for Emotion Regulation in Children and Adolescents with Autism Spectrum Disorder: A Systematic Review and Meta-Analysis

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Background: There is evidence that indicates that children with Autism Spectrum Disorder (ASD) usually present difficulties in emotional regulation that interfere with their adaptive functioning. These difficulties can be manifested in problems in recognizing one’s own and others’ emotions and less use of adaptive emotional self-regulation strategies. These difficulties can trigger episodes of disruptive behavior At the present time, pharmacological interventions have shown efficacy at the level of externalizing symptoms (e.g., irritability) and internalizing symptoms (e.g., anxiety), although many children continue to present problems in emotional regulation that do not respond to pharmacological treatment.

Objectives: The objective of this study was to systematically review the evidence on improvements in clinically relevant measures after a specific non-pharmacological intervention for emotional regulation in children and/or adolescents with ASD.
Methods: An electronic search of four databases (PsycInfo, PubMed, Scopus, Web of Science) was conducted to identify potential studies. The manual search consisted in the screening of the reference list of related articles and contacting corresponding authors of topic-related studies in order to request unpublished data. Only peer-reviewed English-written articles addressing interventions targeting emotion regulation in children and/or adolescents were included. Non-empirical study (e.g. review articles) and studies with less than 5 participants with ASD were excluded.

Results: A total of 16 studies were included in the systematic review. The meta-analysis found statistical significant within-group differences after the non-pharmacological intervention for emotion regulation (Cohen’s $d = .72$, 95% CI [0.54, 0.92], $p < .001$); internalizing symptoms (Cohen’s $d = .74$, 95% CI [0.56, 0.91], $p < .001$); externalizing symptoms (Cohen’s $d = .86$, 95% CI [0.59, 1.13], $p < .001$); social skills (Cohen’s $d = .55$, 95% CI [0.31, 0.80], $p < .001$); and parent-related outcomes (Cohen’s $d = .23$, 95% CI [0.11, 0.34], $p < .001$). Also, statistical significant differences were found between-groups, with the ASD showing greater improvement than the control group (Cohen’s $d = 1.01$, 95% CI [0.38, 1.63], $p = .002$) after the intervention being completed.

Conclusions: Non-pharmacological interventions appear to improve not only emotion regulation, but also clinically relevant outcomes for children/adolescents with ASD, as well as parental outcomes. Furthermore, it is suggested that this improvement is greater than the control condition (e.g. treatment as usual) with a large effect size. The limited number of studies and the subjective nature of the measures compromise the interpretation of the results. More research is needed to study the efficacy of non-pharmacological interventions for emotion regulation in children and adolescents with ASD, and to study the impact of potentially interfering variables, such as the concomitant presence of Attention Deficit Hyperactivity Disorder and/or intellectual disability.

435.287 (Poster) Online Parent Training for Sleep Disturbances in Children with Autism Spectrum Disorder: A Pilot Study


Methods: Parents/Caregivers of 26 children aged between 3 and 12 years with ASD and concomitant sleep disturbances were included. Exclusion criteria were (i) participants diagnosed with medical conditions that have a relationship with sleep behavior (e.g., restless leg syndrome); (ii) participants identified as having exclusively sleep difficulties for which behavioral treatment has not shown efficacy (e.g., breathing-related sleep disorders); and (iii) modification of pharmacological status (either by introduction/withdrawal or dose modification). The online parent training consisted of four 1-hour sessions with a group format and a weekly frequency. One month after the end of the intervention, a follow-up telephone session was carried out. Evaluation measures included sleep disturbances (CSHQ), chronotype (Morningness-Eveningness Scale for Children, MESC) and maladaptive behaviors (Aberrant Behavior Checklist, ABC). Also parent quality of life (The PedsQL Family Impact Module) was assessed. A set of repeated-measure t-tests were conducted in order to analyze differences at post intervention and one-month follow-up for each outcome measure. A self-developed social validation survey was included in order to assess satisfaction and goal achievement.

Results: At the end of the intervention, statistical significant differences were found for the CSHQ total score ($t = 5.13$, 95% CI [4.21, 9.86], $p < .001$, $d = 8.00$) suggesting a reduction in the sleep disturbances in the children with ASD. Also, statistical significant differences were found in the MESC ($t = 2.56$, 95% CI [3.9, 3.61], $p = .02$, $d = .37$) with a reduction in the group mean score pointing to a decrease in the extreme predominantly evening chronotype of the children with ASD. The ABC did not show significant differences at the end of the intervention, but in the one-month follow-up after the intervention ($t = 2.26$, 95% CI [.65, 14.15], $p = .03$, $d = .26$), pointing to a reduction in the maladaptive behaviors in the children with ASD. Parent quality of life did not show significant differences in either of the two evaluation moments. Parents showed high scores on the social validation survey.

Conclusions: The four-session online parent training appears to show improvement in sleep problems in children with ASD. At the same time, it seems to decrease maladaptive behaviors and regulate the circadian rhythm. The small sample size, as well as the lack of a control group, limit the generalizability of the results. More studies are needed to verify the efficacy of the online training program in this population as well as to study the predictive variables of improvement.

Interventions - Pharmacologic
Background: Brain function is the dynamic output of coordinated Excitatory (E) glutamate and Inhibitory (I) γ-aminobutyric acid (GABA) activity. Although alterations in the GABA system have been implicated in autism spectrum disorders (ASD), human studies have largely relied upon ‘correlational’ approaches to establish a link between e.g. ‘GABA’ genes or bulk tissue levels of GABA and spontaneous brain activity (at rest) and task-related sensory processes. Correlations are not causal; a more direct way to establish that a neurosignalling system is involved in candidate brain process is to challenge it and observe a change in the mechanism. This is basis of animal study designs, but there has been limited translation to humans.

Objectives: Here we used EEG to measure the aperiodic slope (1/f) and response to repeated auditory stimulation (event-related spectral perturbation; ERSP) to test the hypotheses that the control of resting brain activity and auditory sensory suppression is GABA-dependent (modulated by the GABA_A receptor agonist, arbaclofen) and is altered in ASD.

Methods: EEG data was available from 66 adults (n = 28 ASD). Resting state aperiodic 1/f and event-related neurophysiological responses (temporal and frequency domains) to repetitive standard tones and novel deviants presented in an oddball paradigm were compared after double-blind administration of placebo, 15 or 30 mg of arbaclofen (STX209), a GABA type B (GABA_B) receptor agonist in randomized and double-blind order. The oddball paradigm comprised repetitive standard tones (1066 trials) and intermittent deviant tones that differed from the standard in terms of frequency (78 trials), duration (78 trials) or both (78 trials).

Results: We demonstrate that GABA control of brain activity at rest is altered in ASD. Specifically, an aperiodic shift was elicited at a lower (15mg) dose of arbaclofen in autistic individuals as compared to non-autistic individuals. We also demonstrate differences in GABA control of auditory suppression. Specifically, weaker auditory suppression in autistic individuals was strengthened by arbaclofen; stronger auditory suppression in non-autistic individuals was weakened by arbaclofen. We also report that the extent of GABA-dependent differences in auditory processing in ASD is strongly correlated with autistic symptomatology measured using Autism Quotient (AQ).

Conclusions: Our ‘resting-state’ results suggest that autistic individuals have homeostatic differences in the GABAergic regulation of ‘background’ E-I. Next, our results confirm that GABAergic dysfunction is fundamental to the neurophysiology of auditory sensory processing alterations in ASD. Finally, these GABA-dependent differences in ‘fundamental’ brain processes appear to be upstream of more complex autistic phenotypes.
A Randomized Placebo-Controlled Trial of Arbaclofen Vs. Placebo in the Treatment of Children and Adolescents with ASD. the "Arba Study"

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Background:
Alterations in neuronal excitation and inhibition (E/I), potentially leading to an altered signal to noise ratio, have been suggested as a potential mechanism for impairment in autistic individuals, a theory is supported by genomics, systems neuroscience and cross species studies. In this context, it is reasonable to interrogate E:I balance as a potential therapeutic target. Arbaclofen, the R enantiomer of baclofen and a GABAB agonist, has been evaluated in both FXS and ASD, and previous data suggested potential benefits for subgroups of individuals.

Objectives:
Primary Objective: To examine the effect of arbaclofen vs. placebo on social function as measured by the Vineland-3 – social domain.

Secondary /exploratory objectives: To examine a) safety and the effect of arbaclofen vs. placebo on measures of global function, associated symptoms, and quality of life, and b) the utility of electrophysiology (EEG, MEG) and sensory discrimination in predicting response to treatment.

Methods:
This is a 4-site, double-blind, placebo-controlled, phase II RCT. We aligned primary and secondary aims, trial design and inclusion/exclusion criteria, across two networks and jurisdictions, to allow for a pre-specified, secondary pooled analysis. Modifications to previous protocols were made based on lessons learnt from previous trials, so as to extend both duration of exposure (16 weeks) and increase dose range (up to 20 mg tid), and restrict inclusion criteria. Participants were ages 5:0-17:11 years, with an ASD diagnosis and complex language (ADOS modules 3 or 4). They were randomized 1:1 to arbaclofen or placebo. Without breaking the blind, participants were offered participation in open label continuation with identical protocol. Biomarkers included EEG and sensory discrimination tasks, and the study was embedded within the POND network, which contributed genomic and imaging data. Safety and tolerability were assessed via the SMURF interview, ESS-CHAD and C-SSRS.


Results:
Ninety participants (80 % male, mean age 12.4 years) were randomized. At the time of submission, all RCT procedures are complete with 82 participants completing all visits and 8 premature discontinuations (4 due to adverse events, 4 due to withdrawal of consent). The database has been locked and is in the analytic phase. Efficacy data will be available by end of 2022. We report here safety data for the full sample. Arbaclofen was overall well tolerated. The majority of AEs were mild to moderate, with most commonly reported AEs related to fatigue and psychomotor agitation. There were two participants that experienced a serious adverse event related to decreased level of consciousness at the highest dose. The events were deemed to be likely related to Arbaclofen, requiring protocol modification.

Conclusions:
We leveraged lessons learned from previous trials of Arbaclofen in ASD, to develop a mostly shared protocol and pre-specified pooled analyses across Canada and Europe. Arbaclofen was relatively well tolerated. We will present efficacy, safety and biomarker of treatment response data to further inform the value of E:I balance as a therapeutic target, explore the utility of the pre-specified biomarkers in prediction of treatment response and discuss models of collaboration.
Background:

Developing drugs for ASD defining symptoms (i.e. social reciprocity difficulties and stereotyped/repetitive behaviours/movements, with functional impact) is challenging because of a limited understanding of their underlying pathophysiology(ies). With the accumulating evidence suggesting a role for the excitatory/inhibitory imbalance as key for the development of pathological trajectories compatible with ASD, some molecules that impact such balance and have proved benefit in preclinical studies are being tested in clinical trials. We therefore setup a publicly funded academic-industry collaborative double-blind Randomized Control Trial (RCT) with arbaclofen (GABA-B agonist) versus placebo, to assess its effect on core and/or comorbid symptoms in ASD.

Objectives:

Primary objective: to assess the effect of arbaclofen versus placebo on social function in a sample of autistic children and adolescents with fluent speech; secondary objectives: 1. To examine the effect of arbaclofen versus placebo on measures of global function, other adaptive domains and measures of ASD defining and associated behaviours. 2. To examine safety and tolerability of arbaclofen in children and adolescents with ASD.

Methods:

AIMS-CT1 is an international, multi-site, double-blind, parallel group Phase II randomized clinical trial. Males and females aged 5:0-17:11 years, with a diagnosis of ASD and fluent speech were included. Eligible participants from 7 sites were randomized on a ratio of 1:1 for a 16-week treatment period. Medication was titrated over 5 weeks. The primary outcome is the effect on social function from weeks 0 to 16 measured on the Socialization domain of the Vineland Adaptive Behavior Scales, 3rd editionTM. Secondary outcome measures included the CGI-S (Clinical Global Impression-Severity), CGI-I (Clinical Global Impression-Improvement), other areas of adaptive function, social communication and other autism symptoms, co-occurring behavior problems and health-related quality of life. Electrophysiological markers (together with genetic and digital biomarker metrics) were also acquired. Safety and tolerability were assessed via several instruments including the SMURF, ESS-CHAD and C-SSRS.

Clinical Trial Registration: EudraCT number: 2018-000942-21 and ClinicalTrials.gov registry number: NCT03682978. Currently under protocol v.9.1, dated 18.06.2022.

Results:

124 participants (80 % male, mean age 11.8 years old) were randomized (randomization closed on September/2022). At the time of this submission 99 patients had completed the study, 14 participants were ongoing, 8 had dropped-out and 3 were lost to follow-up. Last visit of the last patient will take place on January/2023. Closing of the database is expected by March/2023 and primary outcome analysis by April/2023.

Conclusions:

AIMS-2-TRIALS has proved to be an efficient network in setting up and deliver an academic-designed clinical trials for core symptoms of ASD and support future drug development. Most patients completed the protocol, with no major adverse event. The outcomes of this trial (primary outcomes will be available in April/2023), together with the parallel Canadian trial (also presented in this panel) will contribute to the evidence base for medications used to help social difficulties among young autistic individuals.
particularly relevant for the randomized placebo-controlled trial of ARBaclofen in the treatment of children and adolescents with ASD. ARBaclofen is a GABAα agonist, a potential therapeutic target for the E/I balance. The E/I balance is posited to be altered in several neurodevelopmental disorders including ASD. In preclinical models of FXS, Baclofen normalized the gamma resting state power aberrant increase. In humans, Arbaclofen was found to normalize visual processing measured by EEG in a small group of adult ASD (Janz et al, 2022; Jonak et al, 2022; Huang et al, 2022).

**Objectives:** The first objective was to evaluate whether EEG metrics were modified by Arbaclofen in ASD children.

**Methods:** The study was multisite over Canadian and European hospitals. An EEG battery of measures was used to assess 192 (68 CND, 124 European) participants at baseline, and after the 4.5 months of treatment or placebo. The EEG battery consisted of social, nonsocial and pure resting state, face ERPs, auditory steady state, visual steady state and auditory oddball. These tasks were chosen because they were found abnormal in ASD. After preprocessing the data to clean the signal from artefacts, EEG metrics reflecting synchronization of the signal, spectral density and distribution, connectivity, repetition effect, and response to deviants will be extracted. Statistical analyses will verify the differences between treatment groups using an analysis of covariance with baseline and age as covariates. Analyses of stratified groups according to behavioral symptoms severity and EEG metrics at baseline will be conducted.

**Results:** We hypothesize most EEG metrics will be correlated with the level of severity of ASD symptomatology. We further hypothesize that Arbaclofen will modify EEG metrics, in particular the gamma power, and synchronization of the response of the steady-state evoked potentials. The treatment associated modifications will be predicted by the baseline severity of symptoms.

**Conclusions:** Implications of this study are multiple. First, it will demonstrate the relevance of using EEG as an outcome measure in a multisite ASD clinical randomized clinical trial. Second, it will identify the brain function mechanisms affected by GABAα agonists. Third, it will confirm the EEG metrics sensitive to E/I imbalance. Last, it may identify potential treatments for ASD children.

### PANEL DISCUSSION — INTERVENTIONS - PHARMACOLOGIC

#### 225 - Oxytocin Therapy for Autism: An Overview of the State-of-the-Art and Future Directions to Take


Discussant: Keith Kendrick, University of Electronic Science and Technology of China, Chengdu, China

Social interactions are an inherent corner stone of human behavior. One neurobiological system that is suggested to underlie and facilitate pro-social behavior is the oxytocinergic system. In the human brain, oxytocin is produced in the hypothalamus where it acts as an important neuromodulator for mediating a broad range of affiliative behaviors, including inter-personal bonding, social attunement and attachment, primarily through its top-down effects for modulating ‘social salience’ and its bottom-up function in regulating central and autonomic nervous system function impacting (social) stress and anxiety responses. Especially in the field of autism spectrum disorders (ASD), intranasal administration of oxytocin is increasingly considered as a potential novel treatment for elevating the socio-communicative problems that are at the core of this condition. The panel session will provide an overview of the state-of-the-art of the oxytocin research field, ranging from preclinical, mechanistic research to the clinical application of (chronic) intranasal oxytocin therapy in human trials with individuals with ASD. Also recent insights into the importance of optimizing frequency, dosing and administration routes will be discussed. Together, gaining integrated treatment-mechanistic insights from animal models, pharmaco-neuroimaging studies, oxytocin biology and (epi-)genetics will allow delineating challenges and opportunities for the field to move forward.

**225.001 (Panel Discussion) A History of Oxytocin Research in Autism and Beyond: A Road from Mechanistic Models to Efficacy RCTs in Clinical Populations

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Background: Intranasal administration of the neuropeptide oxytocin has been suggested as a potential therapy for autism spectrum disorders (ASD). However, current scientific findings are complex and inconsistent, and the bridge to clinical practice applications is still fragile.

**Objectives:** In this first panel contribution, we will provide a brief history of theoretical models regarding the proposed prosocial effects of oxytocin. Next, we review existing evidence for a dysfunctional oxytocinergic system in ASD and recent insights into the efficacy and safety of oxytocin interventions in ASD populations. Here, we particularly focus on insights obtained from our recent, large-scale oxytocin trial investigating the immediate and long-term effectiveness of daily intranasal oxytocin administration in children with ASD.

**Methods:** Both preclinical single-dose administration studies with neurotypicals will be presented, as well as clinical, multiple-dose oxytocin administration studies with individuals with ASD. A main focus will lie on empirical data from our recent multiple-dose RCT
including 77 children with ASD (61 boys, 16 girls) aged 8-12 years examining the clinical efficacy and safety of a four-week treatment of 12 IU of oxytocin dosed twice daily.

Results: While introducing some key theoretical mechanistic models underlying oxytocin’s action, empirical results will be presented from some of our recent single-dose administration studies, demonstrating oxytocin’s role in modulating social attention processes (‘salience’) and reducing anxiety and stress. Next, existing evidence regarding a dysfunctional oxytocinergic system in people with autism will be presented based on our recent meta-analytic analyses of altered oxytocin hormonal levels and epigenetic modifications of the oxytocin receptor gene. Finally, a comprehensive review will be provided of oxytocin RCTs in both children and adults with autism, with a special focus on new emerging insights from our recent RCT with school-aged children. In short, novel, unpublished results will be discussed indicating that children who received oxytocin in combination with concomitant psychosocial treatment displayed greater benefits than those who received oxytocin alone (p < .05). Further, an interaction between parental belief about treatment allocation and treatment response was identified, however, only in the experimental oxytocin group, not in the placebo group, ruling out the possibility of a general parental-expectancy-induced placebo effect. Accordingly, the possibility of ‘responder/non-responder’ subgroups will be discussed, suggesting that parents might have been able to correctly detect ‘real’ treatment responders from non-responders.

Conclusions: We will conclude this first panel presentation with some key take home messages regarding the state-of-the-art of oxytocin treatment for ASD. The talk will also conclude with the formulation of several directions and opportunities for future research, introducing some of the emerging topics of the subsequent panel talks.

225.002 (Panel Discussion) Common and Differential Molecular Mechanisms of Acute and Repeated Oxytocin Effects in Autism: Human Genome-Wide Exploration / Pharmaco-Neuroimaging Trial and Back Translational Animal Study

H. Yamasue, Hamamatsu University School of Medicine, Tokyo, Japan

Background: Although oxytocin is expected as a candidate therapeutic for the core symptoms of autism spectrum disorders (ASD), its unknown mechanism of actions and the significant variability in oxytocin efficacy among individuals impede the development of oxytocin-based therapies.

Objectives: First, we explored common molecular mechanisms underlying acute and repeated oxytocin effects on ASD core symptoms by exploring single nucleotide polymorphism (SNP) associated with individual variability in oxytocin efficacy. Next, considering recent notions of differential effects of acute- versus repeated-dosing, a comparison in neurochemical changes induced by acute versus repeated dosing was conducted, using data from a preclinical animal study and a human clinical pharmaco-neuroimaging trial. Methods: Genome-wide association studies (GWAS) were conducted on placebo-controlled, double-blind trials datasets in adult males with ASD administered with intranasal oxytocin: 1st dataset was from a single-site, crossover, within individual, single-dose administration trial (40 participants, UMIN000002241/000004393); 2nd dataset was from a multi-site, parallel-group, six-week administration trial (106 participants, UMIN000015264); 3rd dataset was from a multi-site, crossover, within individual, four-week intranasal administration of oxytocin with enhanced bio-availability (109 participants, NCT03466671/UMIN00003141). The outcomes on which efficacy of oxytocin was detected were extracted from these trials, and genomic datasets were collected. Finally, neurochemical changes in glutamatergic function were assessed after single- or repeated administration in a cohort of adult male C57BL/6J mice (medial frontal transcript expression levels; 16 mice) and a human cohort of men with ASD (medial prefrontal H-magnetic resonance spectroscopy; 19 participants).

Results: A GWAS in the 1st dataset revealed that a SNP was associated with acute oxytocin-induced improvements of medial prefrontal functional MRI activity during a social judgment task at a genome-wide significance level. The 2nd dataset confirmed the same SNP’s significant association with repeated oxytocin-related improvements in Autism Diagnostic Observation Schedule (ADOS) repetitive behavior and those in quantified facial expressions during social interaction in ADOS administrations, but not associated with the placebo effects. Furthermore, the 3rd dataset also showed a significant association between the same SNP and efficacy of repeated oxytocin to reduce ADOS social reciprocity score. Although the SNP was identified with genome-wide exploration, it was annotated to a gene which belongs downstream of oxytocin signaling. Finally, both in mice and humans, the glutamatergic system showed a unique sensitivity to repeated, not single-dose, oxytocin administration which may explain differential behavioral effects of oxytocin between acute and repeated administration.

Conclusions: Three independent datasets demonstrated the association of the same SNP with both acute and repeated oxytocin’s efficacy on clinical, behavioral, and neural outcomes linked with ASD core symptoms, and revealed the first clinical evidence for the role of the gene in modulating oxytocin’s efficacy in treating ASD symptoms. Together, the current results suggest that further integrative and comprehensive analyses with multi-layer omics data from the multiple RCT datasets including metabolomic, proteomic, and micro RNA data as well as genomic data should be promising. It can be expected that such analyses identify molecular networks underlying acute and repeated effects of oxytocin for integrative understanding and also provide novel therapeutic molecular targets for ASD core symptoms.

225.003 (Panel Discussion) Oxytocin Therapy for Autism: Importance of Dose Frequency, Context and Route of Administration

K. M. Kendrick, University of Electronic Science and Technology of China, Chengdu, China
Background: In recent years a number of clinical trials have reported variable effects of repeated intranasal oxytocin treatment on social symptoms of children and adults with autism. Inconsistent findings may have been contributed to by a number of factors including dose and dose frequency (i.e. problems related to inverted U response curves and receptor desensitization) and absence of associating treatment in some way with receipt of a positive social experience. Person-specific factors such as age, gender and genotype may also influence effects. Additionally, the use of an intranasal administration route may not be essential for oxytocin to produce functional effects and an oral route could be more efficient for delivering the peptide and better tolerated, especially in young children. In terms of objective measurement of oxytocin treatment outcomes on social attention utilizing eye-tracking measures could also be valuable. Over the past 5 years, we have been investigating the importance of many of these aspects in a series of both pre-clinical and clinical trials.

Objectives: To determine if: (1) dose frequency of intranasal oxytocin and oxytocin receptor genotype may influence its neural and behavioral efficacy, (2) giving a positive social experience after treatment can improve intervention outcomes (3) eye-tracking measures or social attention can be used as an additional objective measure of improvement in social symptoms and (4) an oral administration route can produce comparable or improved functional outcomes relative to an intranasal one.

Methods: Both randomized, placebo-controlled pre-clinical and clinical trials involving neurotypical adults or young children (3-8 years) with autism. Preclinical trials incorporated behavioral and brain imaging (fMRI or fNIRS) measures as well as eye-tracking and peripheral measures of oxytocin concentrations in response to intranasal or orally administered oxytocin. A clinical trial on autistic children used objective clinical assessments (ADOS-2), parent completed questionnaires together with eye-tracking and oxytocin measurements to determine effects of a 6-week intervention with less frequent doses of intranasal oxytocin (every other day) given in conjunction with a subsequent positive social interaction involving play.

Results: Overall, results demonstrated that when given less frequently intranasal oxytocin produces more consistent neural and behavioral responses to social stimuli in healthy adults, and in conjunction with positive social interactions can also significantly improve social symptoms (notably improved ADOS-2 scores and greater interest in social stimuli) in young autistic children. Eye-tracking measures were also sensitive to oxytocin interventions. Preclinical studies in healthy adults demonstrated that acute oral administration of oxytocin had similar effects to intranasal administration in terms of influencing social attention and responses to social touch and producing greater activation in brain reward regions in response to positive facial emotions.

Conclusions: Oxytocin-based interventions in autism still have therapeutic potential but more studies are needed to determine optimal dosing strategy and duration as well as its use as an adjunct to positive behavioral interactions. Oral as opposed to intranasal administration may provide a more effective route. The importance of factors such as age, gender and genotype in determining treatment responses still need to be better established.

225.004 (Panel Discussion) The Effects of Multiple-Dose Oxytocin Treatment on Human Neural Circuitry: Initial Insights from Recent Pharmaco-Neuroimaging Studies in Autism.


Background: The past decade, intranasal administration of oxytocin is increasingly explored as a new treatment for alleviating the core symptoms of autism spectrum disorder (ASD). However, previous behavioral clinical trials have yielded an inconsistent pattern of clinical effects, with some studies showing beneficial effects, while others identified no benefit of oxytocin over placebo treatment. Objectives: To further our understanding of variability in (clinical) treatment responses, it is of great importance to gain deeper insights into the neural substrates that underlie oxytocin treatment effects. Particularly the impact of multiple-dose oxytocin treatment on human neural circuitry is largely unknown, and also the possibility that long-term oxytocin use may induce long-lasting neural adaptations remains fairly unexplored.

Methods: Results from our recent randomized placebo-controlled pharmaco-neuroimaging clinical trials with adults and children with autism will be presented, evaluating the clinical efficacy and neural effects of continual intranasal oxytocin treatment, administered daily over a period of four-weeks. Multi-modal characterizations, including fMRI neuroimaging, electroencephalographic recordings and assessments of stress physiology were performed to evaluate neurophysiological basis of oxytocin’s treatment effects. Also biological evaluations, including epi-genetic characterizations and oxytocin hormonal levels were performed. To assess the possibility of long-lasting neural consequences of multiple-dose oxytocin treatment, neuroimaging was performed up to four weeks and even one year after cessation of the treatment.

Results: Irrespective of the age group, significant effects of oxytocin treatment on amygdala circuitry were evident, indicating reduced functional coupling of the amygdala to prefrontal regions in the oxytocin group, compared to the placebo treatment group. A retention of neural circuitry changes was evident up to four weeks in the pediatric sample, and up to one year in adults with ASD. Also, irrespective of the age group, stronger neural responses were associated with more pronounced behavioral improvements on core autism symptom.
Background: Phelan-McDermid syndrome (PMS) is a rare neurodevelopmental disorder caused by haploinsufficiency of the \textit{SHANK3} gene. PMS is associated with intellectual disability, autism, and behavioral abnormalities. Epilepsy occurs in ~25% of cases, and when present significantly impacts quality of life for affected individuals and their families (Celik, et al., 2021). AMO-01 is an experimental therapeutic that acts as a Ras-ERK pathway inhibitor. Activation of the Ras-ERK pathway has been previously implicated in seizure generation and Ras-ERK pathway inhibitors may reduce seizure frequency. In a \textit{Shank3} mouse model (\textit{Shank3b−/−}), significantly reduced audiogenic seizures were observed after a single dose of AMO-01. However, AMO-01 has never been tested as an anti-epileptic in humans with PMS.

Objectives: The objectives of this pilot, open-label trial were to assess: 1) safety and tolerability of AMO-01, and 2) reduction in seizure frequency.

Methods: Six individuals were enrolled and five were included in the analysis (3 male, mean=20.6 years). One participant was excluded since epilepsy was well-controlled and no seizures occurred during the Screening-Baseline period. Eligibility criteria included (1) confirmed PMS diagnosis (loss of \textit{SHANK3} by deletion or sequence variant), (2) 12-45 years and post-pubertal, (3) epilepsy diagnosis, (4) rated at least “moderately ill” on the Clinical Global Impression Severity scale. The trial consisted of five main visits: pre-trial Screening, Baseline, and three post-drug follow-up visits at Weeks 1, 2 and 4. A single 6-hour intravenous infusion of 120 mg/m² of AMO-01 occurred at Baseline. Adverse Events (AE) were assessed using the Systematic Longitudinal Assessment of Adverse Events form during the infusion, the day after, and at all follow-up visits. Caregivers completed a Seizure Diary, recording each seizure during the trial, from Screening to Week 4. Change in weekly seizure frequency was assessed from Baseline to Weeks 1, 2 and 4 using Wilcoxon signed-rank tests on log-transformed data to look for relative change. Criteria for 25% reduction of seizures were met if the upper-end of the 2-sided 95% confidence interval was equal to or lower than 0.75 of the Baseline scale.

Results: No serious AEs were reported. The most common AEs were increase in stereotypies, rituals, repetitive behaviors and in appetite, both reported in 2/5 (Table 1). Weekly seizure frequency was significantly reduced at all timepoints. From Baseline to Week 1, seizures reduced from an average of 39±59 to 5±9 \((p=0.043)\), to 23±50 \((p=0.043)\) at Week 2, and 10±20 \((p=0.042)\) at Week 4. Seizure frequency was reduced by at least 25% at all timepoints (Figure 1). Seizure reduction ranged from 38% to 100% per person at Week 1, 18% to 100% at Week 2, and 67% to 100% at Week 4.

Conclusions: Results from this preliminary study show the safety and tolerability of AMO-01. Seizures were significantly reduced in this cohort. Future studies with larger sample sizes, repeated dosing, and placebo control are needed to confirm the impact on seizure frequency, test for possible impact on secondary clinical outcomes, and determine optimal dosing and infusion schedule.

415.260 \textit{(Poster)} Assessment of the Impact of Standard-of-Care Treatment for ASD-Associated Enterocolitis: A Longitudinal Study
Background: Chronic gastrointestinal (GI) symptoms, common in children with an autism spectrum disorder (ASD) diagnosis, are difficult to properly diagnose and effectively treat. The paucity of published information regarding specific therapeutic strategies and corresponding treatment outcomes in this unique patient population continues to complicate an already challenging situation. The treatment study described here was undertaken to address this information gap by providing a longitudinal assessment of the efficacy of standard-of-care treatment on GI symptoms and ASD characteristics in a group of GI-symptomatic children with ASD.

Objectives: The clinical effect of treating ASD-associated inflammatory bowel disease (IBD) has not yet been systematically evaluated, documented, analyzed, or reported. The objective of this study was to determine whether conventional treatment of IBD in children with ASD positively impacts both GI symptoms and core ASD behaviors and cognition. The overall goal of this pilot trial was to obtain data that would be exceptionally beneficial in generating a uniform “standard of care” for children with ASD who were being evaluated for chronic GI symptoms and shown to have treatable intestinal inflammation.

Methods: Following diagnostic assessment by a pediatric gastroenterologist and confirmation of eligibility (i.e., evidence of enteroocolitis at endoscopy, capsule endoscopy, and/or biopsy), eleven male children with ASD were enrolled in the study and evaluated for one year during their ongoing treatment regimen which included induction corticosteroids followed by non-steroidal 5-ASA agents (and immunomodulators/biologics - as clinically warranted). Patient caregivers completed baseline GI symptom and ASD questionnaires at various time points over a 12-month period: at baseline just prior to treatment initiation, weekly (GI questionnaires); (1) Gastrointestinal Symptom Survey Bowel Movement Chart (GISS-BMC), and (2) Gastrointestinal Symptom Survey Externalizing GI Behaviors (GISS-EB)), quarterly (Aberrant Behavior Checklist (ABC)), semiannually (Social Responsiveness Scale (SRS-2)), and annually (Vineland Adaptive Behavior Scale II (VABS II)). Non-parametric Wilcoxon Signed-Rank Test was used to compare data between time points; p ≤ 0.05 was considered statistically significant.

Results: Eleven participants completed the 52-week study. A total of 877 GiSS weekly surveys (426 GiSS-BMC; 451 GiSS-EB) were included in the analysis. In addition, data from 103 ASD questionnaires (50 ABC; 31 SRS-2; 22 VABS II) were analyzed. Although outcomes (i.e., magnitude of change) varied from individual to individual, data from ten of eleven participants indicated significant improvements in both GI symptoms (Figure 1) and ASD behaviors and cognition (Figure 2) during, and following, one year of treatment.

Conclusions: This pilot study, part of a larger ongoing trial that will enroll and evaluate an additional 20 children, provides compelling preliminary evidence for the efficacy of standard-of-care treatment in children with ASD and co-occurring enterocolitis to improve both the gastrointestinal symptom profile as well as ASD-associated behaviors and cognition.

415.261 (Poster) Autologous Umbilical Cord Blood Infusion for the Treatment of Autism - a within-Subject Open-Label Study on Safety and Efficacy


Background: Stem cell therapy for autism has been performed in recent years, both within the remit of clinical trials, but also offered as paid treatment by some facilities. The treatments have ranged from intravenous infusions of umbilical cord blood (UCB) and human cord tissue mesenchymal stromal cells, to intrathecal injections of bone marrow mononuclear and mesenchymal stem cells. UCB possesses paracrine regulatory functions and can alter immune dysfunction via cellular messaging, repair T and B cell pro-inflammatory activity and counterbalance overproduction of gial cells. This study commenced in December 2019 when early publications on UCB infusion indicated the potential for treatment benefit. The use of autologous UCB in a within-subject open-label clinical trial was approved by the local Institutional Review Board.

Objectives: To document the safety and efficacy of a single infusion of autologous UCB in 20 children aged 24 to 72 months with autism.

Methods: A pre-post treatment within-subjects design was used for this open label trial. Participants underwent baseline psychometric measures at T=0, and no changes were made to their standard care (early intervention programme) for 6 months. The same measures were repeated at T=6 months, and participants then received a single infusion of autologous umbilical cord blood. Safety evaluations were administered at 3-monthly intervals after treatment, and the psychometric measures were repeated at T=12 and T=18 months. These measures were: Vineland Adaptive Behaviour Scale (VABS-II), Stanford Binet Intelligence Scale (SB-5), Expressive One-Word Picture Vocabulary Test (EOWPVT), Brief Observation of Social Communication Change (BOSCC), Pervasive Developmental Disorder-Behaviour Inventory (PDDBI), Repetitive Behaviour Scale-Revised (RBS-R), Sensory Experience Questionnaire (SEQ-2.1), Child Behaviour Checklist (CBCL), and Clinical Global Impression- Severity and Improvement Scales (CGI).
Results: 20 children were recruited (16 male; 13 Chinese, 4 Indian, 3 Other Races). Mean (SD) age was 4.08 (0.67) years. 19 completed the study and 1 was withdrawn due to cord blood not meeting quality control criteria on pre-release testing. Mean (SD) cell dose administered was 38.16 (9.82) million cells/kg. None of the children suffered serious adverse events and the infusion was well-tolerated. The commonest side effects were mood swings (n=7), irritability (n=5), increased repetitive behaviours (n=5) and hyperactivity (n=4), but were generally self-limiting. Data on efficacy are being analysed but will be ready for INSAR 2023.

Conclusions: A single infusion of autologous UCB in children with autism may be well-tolerated, but does come with possible side effects. Benefits remain to be seen. Stem cell therapies for autism should therefore still be conducted under strict unbiased clinical trial conditions in order to inform about all risk-benefit considerations towards evidence-based best practices.

415.262 (Poster) Cannabidiol Study in Children with Autism Spectrum Disorder (CASCADE): A Double-Blind, Placebo-Controlled Study to Investigate Efficacy and Safety of Cannabidiol in Children and Adolescents with Autism

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Background: Individuals with ASD frequently have behavioral issues and psychiatric comorbidities which can be difficult to manage and cause significant adaptive impairment. Currently, there are only two FDA approved medications for the treatment of irritability in ASD. Both medications have the potential for significant long-term side effects, including weight gain, tardive dyskinesia and elevated triglycerides. Caregivers often wish to avoid these medications, or look to alternative treatments when traditional medications are ineffective or intolerable. Preliminary studies suggest that cannabidiol (CBD), a non-psychoactive cannabinoid, may lead to improvements of behavioral symptoms in ASD including irritability, aggressive behaviors, and anxiety.

Objectives: To evaluate the efficacy of CBD for 12 weeks in patients 5 to 17 years of age on the primary outcome of irritability and aggressive behaviors, and secondary outcomes of anxiety, social communication, behavior, ASD symptoms, family stress, quality of life, and sleep disturbance in ASD compared to placebo.

Methods:

The CASCADE study is a randomized, double-blind, placebo-controlled study of oral CBD (100mg/mL; Jazz Pharmaceuticals) in children with ASD age 5-17 funded by the Colorado Department of Public Health & Environment, USA (clinicaltrials.gov nct04520685). The modified crossover trial includes 3 arms, including Arms A and B with traditional crossover design (with 3 week washout between drug and placebo period), and Arm C that receives CBD for the entire 27 weeks.

ASD diagnosis is confirmed at baseline by records review and ADOS-2 assessment by psychologist. At each study visit, the same caregiver completes a battery of questionnaires to assess their child’s irritability and aggressive behaviors (Aberrant Behavior Checklist—2nd Edition: ABC-2 Irritability subscale), anxiety (Anxiety, Depression, and Mood Scale; ADAMS), sleep (Sleep Clinical Global Impressions – Severity Scale, Sleep Clinical Global Impressions – Improvement Scale). The OACIS (Ohio Autism Clinical Impressions Scale) interview quantifies severity and improvement in all domains of ASD. Mixed effects general linear models, covarying for gender and age, will specify treatment group (CBD vs placebo), time, and group by time interaction. Efficacy will be determined by improvements in primary outcome (ABC-2 irritability subscale) and changes in scores on secondary outcome measures in the CBD treatment group versus the placebo group after 12 weeks.

Results: 68 participants have consented, including 11 screen fails, 18 active participants, 27 study completions, 11 early withdrawals, and 1 participant terminated by the PI. Of the 57 randomized to date, baseline characteristics include: mean age 10.6 (sd 3.02), 16% female/84% male, Race 84% Caucasian/16% other, Ethnicity 6% Hispanic, Stanford Binet IQ 79.8 (sd 24.7). Mean ABC-Irritability score on study entry was 23.2(sd 7.64). There have been no significant adverse events to date. Enrollment will be completed in early 2023, and cohort demographics, and adverse effects will be presented.

Conclusions: The use of CBD to treat behavioral symptoms of ASD is a promising innovative area of research. The present study will help answer important questions related to safety and efficacy of CBD for treatment of behavioral symptoms of ASD.

415.263 (Poster) Convergence of Two Clinician-Reported Global Impression Scales in Assessing Severity and Change of Autism Symptoms

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Objectives: To evaluate the efficacy of CBD for 12 weeks in patients 5 to 17 years of age on the primary outcome of irritability and aggressive behaviors, and secondary outcomes of anxiety, social communication, behavior, ASD symptoms, family stress, quality of life, and sleep disturbance in ASD compared to placebo.

Methods:

The CASCADE study is a randomized, double-blind, placebo-controlled study of oral CBD (100mg/mL; Jazz Pharmaceuticals) in children with ASD age 5-17 funded by the Colorado Department of Public Health & Environment, USA (clinicaltrials.gov nct04520685). The modified crossover trial includes 3 arms, including Arms A and B with traditional crossover design (with 3 week washout between drug and placebo period), and Arm C that receives CBD for the entire 27 weeks.

Conclusions: The use of CBD to treat behavioral symptoms of ASD is a promising innovative area of research. The present study will help answer important questions related to safety and efficacy of CBD for treatment of behavioral symptoms of ASD.
Background: A key challenge in autism trials is a lack of sensitive clinical endpoints. Clinical Global Impression scales (CGI) are often used to measure symptom severity and improvement and as anchors to derive estimates of meaningful clinical change. While the CGI is a generic 1-item clinician's overall impression, the 10-item Ohio Autism Clinical Impression (OACIS) is autism symptom focused.

Objectives: Explore similarities and differences between two clinician-rated impression scales.

Methods: 339 autistic children between 5-17 years (M_{age}=12.2 years; SD_{age}=3.2 years; female=13%; clinicaltrials.gov identifier: NCT02901431) across placebo and treatment arms were assessed. Inclusion criteria included CGI-S score ≥4 at screening, indicating at least a moderate severity of autism. Severity (CGI-S & OACIS-S) and improvement (CGI-I & OACIS-I) clinician ratings of autism symptoms were obtained at multiple visits. We present frequency distributions, contingency tables to report the percentage of diagonal conformity (accordance on both scales), and Spearman correlational analyses at the 12 and 24 week time points (12W, 24W).

Results: At both follow-up visits, CGI-S and OACIS-S generic scores demonstrated a Gaussian distribution over the response options 2-6 (extreme anchors 1 and 7 with frequency=0), reflecting borderline/some symptoms to severe symptoms. The majority of subjects (~50%) rated with moderate severity. Contingency tables between the two generic scales revealed a diagonal conformity of 78% at 24W (74% at 12W). Correlation analyses confirmed this strong relationship (r_s=.79; p<.001). While some OACIS-S domains revealed a similar distribution as the generic score (e.g., social interaction), others showed a more uniform distribution towards milder severity. The differential score profile between the generic OACIS-S and domains was reflected by diagonal conformities ranging between 35-67% and weak-to-strong correlations (r_s=.29-.81; p<.001).

Generic change ratings showed a trend towards improvement similarly on both arms, with 33% on CGI-I (placebo=36%; trial=31%) and 26% on OACIS-I (placebo=31%; trial=23%) of individuals reporting much or very much improvement at 24W. OACIS-I domains of verbal communication and social interaction showed the largest improvements, which was less so for restricted and repetitive behaviors and other associated symptoms. CGI-I and OACIS-I ratings showed diagonal conformity in 76-81% of individuals across both visits. Correlation analyses confirmed this strong relationship at both time points (r_s=.79-.85; p<.001).

Improvements based on change in severity ratings were less frequently observed with cross-measure comparisons (deltaCGI-S/deltaOACIS-S=35-43% vs. CGI-I/OACIS-I=52-70%). Indicating that minor improvements on improvement scales are not necessarily in concordance with a minor improvement on the severity scales.

Conclusions: While we observed broad convergence in overall global impression scores both for severity and improvement ratings, individual domains reflected a more nuanced pattern of findings. Findings suggest that symptom domains may be weighted differently into a global score. Improvement trends are in accordance with ASD positive placebo response rates. Further, change ratings based on severity vs. improvement scales deviate from assessing minor improvement, questioning the use of CGI-I scales for anchor-based analyses. The results inform future research to develop condition-specific CGIs to assess the severity and improvement across specific autism symptom domains as well as the necessity to include functional impacts.

Keywords: clinician-reported; global impression scales; severity; improvement

415.264 (Poster) Effect of Gabapentin on Cortical Glutamate/Glutamine and Gamma-Aminobutyric Acid Levels, Potential Biomarkers of Social Cognition in Autism

Background: Magnetic resonance spectroscopy (MRS) suggests decreased gamma-aminobutyric acid (GABA) levels as a possible biomarker for social cognition deficits in autism. Gabapentin has been shown to increase GABA acutely in neurotypical individuals. Abnormalities in the anterior cingulate cortex (ACC) and anterior insula (AI) (components of the salience network) are associated with social cognition in autism.

Objectives: We sought to determine which clinical characteristics of autism were associated with glutamate/glutamine and GABA levels in the ACC and right AI, and whether an acute dose of gabapentin alters these levels.

Methods: We recruited 19 autistic adolescents ages 13-17 (17 M, 2 F). We used a Mesher-Garwood Point Resolved Spectroscopy Sequence (MEGA-PRESS) to measure Glx (combination of glutamate and glutamine) and GABA levels in two voxels: one covering the bilateral pregenual ACC and one centered on the right AI. We assessed correlation of Glx and GABA levels with multiple measures of social cognition: the Social Responsiveness Scale (SRS) total score, Reading the Mind in the Eyes Test (RMET) score, SRS subscale scores, and Autism Diagnostic Observation Scale (ADOS-2) scores. Finally, we administered a single dose of gabapentin to 18 of the 19 participants. We repeated the Glx and GABA MRS measurements 2 hours, 4 hours, and 6 hours after gabapentin dosing, and calculated the change in GABA and Glx from pre-dose to each of the individual time points. We used a generalized linear model to assess the relationship of change...
in GABA in the ACC and right AI to the weight-normalized dose of gabapentin (mg/kg), controlling for age, IQ, and baseline GABA/Glx level.

Results: GABA and Glx were correlated with different social cognition assessment scores in the two regions of the cortex. Greater impairment in social cognition was associated with lower levels of GABA and lower levels of Glx in the observed correlations. After gabapentin administration, GABA levels in the right AI rose sharply followed by a fall in levels over time; ACC GABA levels and ACC/right AI Glx levels did not have a robust response. At individual time points, a significant dose response of an increase in GABA in the ACC developed at 4 hours and became nonsignificant at 6 hours; GABA in the right AI demonstrated a statistically nonsignificant dose response of an increase in GABA at early time points that disappeared at 6 hours after the dose; Glx levels demonstrated much smaller (ACC) or absent (RAI) dose responses to gabapentin.

Conclusions: Glx and GABA levels are associated with social cognition measures, but in a region- and neurotransmitter-specific manner. A decrease in GABA levels with social cognition impairment remains the most consistent finding, and we demonstrate evidence that gabapentin may alter GABA/gluatamate imbalance. Implications on the potential clinical utility of gabapentin in autism will be discussed.


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Background:

Due to the various behavioral and participation challenges of children with ASD, their parents are often required to use Family Accommodation (FA) to create and maintain a daily family routine. Although variety of treatments are available, medicine is still challenged to find intervention that alleviates the symptoms of children with ASD and improves family well-being. The effect of medical cannabis intervention for various conditions in children has raised the idea of examining its effect on children with ASD. This mixed-methods study is the first to examine the effect of medical cannabis, not only on child's presentation but also on parental well-being in general and on FA in particular.

Objectives:

the main goals of this study were (1) to examine the impact of medical cannabis intervention on parents reports on their family accommodation, and (2) to deepen the understanding of parent's perspectives on the changes in family accommodation following cannabis intervention.

Methods:

We utilized an explanatory sequential mixed methods design model, which included quantitative data collection followed by in-depth interviews to add deeper understanding and contextualization to the quantitative data.

In the quantitative study we analyzed data of 44 children (5–12 years old) who participated in an extensive research regarding the effect of medical cannabis on children with autism. Parents were asked to complete the Family Accommodation Scale for Restricted and Repetitive Behaviors (FAS-RRB) (Feldman et al., 2019), during three different times: (1) before cannabis intervention, (2) after three months of intervention and (3) after six months of intervention. After completing the intervention, 15 parents of children from the full sample participated in semi-structured in-depth interviews.

Results:

The results of the quantitative analysis indicate a significant decrease in FA after three months of intervention. Moreover, after six months of intervention, there was an additional moderate decrease, however, no longer significant. The decreased need for FA was followed by significant change in the child's short-term response if no parental accommodation has been made, and in the parental sense of distress, after three months of intervention. The following qualitative interviews indicated positive changes in the family’s routine and sense of their well-being as well as parents’ ability to engage in meaningful occupation, and experience enhanced interaction with family and friends due to the decreased FA and child's maladaptive behaviors following the intervention.

Conclusions:

Results support the effectiveness of medical cannabis intervention not only on child's presentation but also on parental well-being in general and on FA in particular. The decreased need for FA has a positive effect on the family's quality of life, parent's preoccupation, and
the interactions of the family members with their environment. Thus, it is important to include Family Accommodation as an additional outcome measure of intervention for children with ASD.

415.266  (Poster) Efficacy and Safety of Bumetanide: Results of a Child and Adolescent Spanish Sample with Autism
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Background: The etiological heterogeneity in autism is considerable. At the molecular level, there has been increasing interest in the role played by glutamate, and several genetic studies support the involvement of the glutamate pathway in autism. Bumetanide, a diuretic agent that reduces intracellular chloride and thereby reinforces GABAergic inhibition, has been found to improve core autism symptoms in children in previous studies.

Objectives: Main: to demonstrate the superiority of bumetanide compared to placebo in the improvement of autism core symptoms, after 6 months of treatment in severely autistic children and adolescents (aged 7-18 years). Secondary: to analyze the adverse effects and safety of bumetanide.

Methods: A 6-month randomized, double-blind, placebo controlled multicentre parallel group study to evaluate efficacy and safety of bumetanide 0.5 mg twice a day followed by an open-label active 6-month treatment period with bumetanide and a 6-week discontinuation period after treatment discontinuation. In addition, the drug was provided to those wanting to pursue the treatment with bumetanide at the end of the main study periods. The study was conducted in autistic children and adolescents. A Data Monitoring Committee was set up and was responsible for periodic review of patient’s safety data throughout the study. This study was performed in strict accordance with Good Clinical Practice. The main criteria for inclusion were: Clinical Global Impression (CGI) – Severity (CGI-S) rating Score ≥ 4, CARS2 (Childhood Autism Rating Scale second edition) ≥ 34 and Social responsiveness Scale (SRS-2) ≥ 66 T-Score. Differences between placebo and bumetanide were analyzed by CARS2, SRS-2, CGI-I improvement and Vineland II Adaptive Behaviour Scale (VABS II). Safety and side effects were also collected. Statistical analyses were performed with SPSS 25.0. The significance statistical level was <0.05.

Results: 7 patients (6 males, 1 female) completed double-blind period (week 26) and 5 completed until 52 week. The 7 patients performed the wend visit. Mean age: 10.29 (SD=3.35). 3 patients were treated with placebo and 4 with bumetanide until week 26 (W026). At table 1 was collected the mean scores for different scales at baseline visit (W00) and at W026. At W026, SRS-2 has a trend to low punctuations in bumetanide group but it was not statically significant (p=0.07). The main side effects in bumetanide group were hypokalemia, polyuria and excessive thirst. Table 2 collects scales’ scores at 52 week (opened-label period) compared with W00. Statically significant differences were found in CGI (p=0.03) and CGI-improvement (p=0.02). After the 6-week discontinuation period, CGI punctuations were significantly worst (p=0.04). 4 of 5 families (80%) requested bumetanide for compassionate use.

Conclusions: Our study failed to demonstrate the superiority of bumetanide compared to placebo after 6 months of treatment in the CARS2 total score, SRS-2 and CGI-I expressed in terms of change from baseline to W026. However, the scales’ scores improved from W052 to W00. As expected, and in line with the known diuretic action and safety profile of the drug, hypokalemia, thirst and polyuria were the most common secondary effects reported on bumetanide group.

415.267  (Poster) High Throughput Virtual Screening of in-House Database Against mGluR5 in Preclinical Models of Autism
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Background:

Autism is a multifaceted neurodevelopmental infirmity, occurring at early childhood. The disorder is manifested by social, cognitive, and language impairment along with stereotypies. Pharmacological interventions for the overall treatment of autism do not exist. However, the medications currently available help only in symptomatic cure and disease management. Thus, the present scenario of drugs for autism urges for searching potential molecules with therapeutic value against autism. Pharmacological inhibition of metabotropic glutamate receptor 5 (mGluR5) is reported to rescue impaired social interaction and autistic and cognitive phenotypes in mouse models. Thus, has been explored in our study.

Objectives:

The present study involves the virtual screening of an in-house small molecule database against mGluR5 followed by a preclinical screening of the shortlisted molecules towards autism-like phenotypes in a cell-based study as well as a zebrafish model of valproic acid (VPA) toxicity.
Methods:

In this study, we have performed the virtual screening for the in-house BITS library, followed by investigating the selected in-house mGluR5 targeted molecules based on docking studies on in vitro and in vivo models. The selected compounds were screened against glutamate-induced excitotoxicity in differentiated Neuro-2a cells using an MTT assay. The promising compounds from the excitotoxicity assay were examined for VPA-induced toxicity in neurospheres. The neurospheres were co-treated for 7 days with VPA (1mM) along with the selected test compounds at different concentrations (0.1, 1, and 10µg/mL), and were investigated for cell proliferation and differentiation. Zebrafish larvae were exposed to VPA (75 µM) from 4 hours to 5 days post fertilization followed by treatment with selected test compounds from 5-7 days post fertilization. Seven days post fertilization battery of behaviour tests (for anxiety, attention deficit, and stereotypic behaviour) were performed followed by gene expression studies.

Results:

We have selected 20 compounds (SD-1 to SD-20) based on molecular interactions and docking scores to screen for inhibition of glutamate-induced excitotoxicity. Five out of 20 compounds were able to reduce excitotoxicity, and two of them had a significant effect. In neurosphere culture, chronic VPA treatment results in decreased proliferation followed by a disrupted differentiation pattern. Interestingly, the co-treatment with our lead molecules rescues VPA-induced neurotoxicity as evidenced by an increase in proliferation followed by differentiation and neurite outgrowth. The best compound (SD-9) was further investigated in the zebrafish larvae model for autism. The post-treatment with SD-9 was able to abrogate VPA-induced behavioural despairs in a dose-dependent manner observed with an open field test, inattentive behaviour test, and circling behaviour test. In addition, SD-9 rescues the effect of VPA on the expression level of autism-related genes.

Conclusions:

In conclusion, the compound SD-9 from BITS in-house database shows neuroprotective activity against VPA-induced toxicity when tested in vitro and in vivo. However, further exploration may be needed to validate the mechanistic aspects of molecules and their use as therapeutics in autism.

415.268 (Poster) How Learnings from Balovaptan Informed a New Drug Development Approach for the Alogabat Autism Program


Background:

Balovaptan, a selective V1a receptor antagonist, has been developed for use in autistic inviduals for treatment of social and communication symptoms. Based on the results of a phase 2 study in adult men with ASD (VANILLA) which demonstrated a positive, clinically meaningful effect on socialization and communication, a pediatric phase 2 trial (aV1ation) and an adult phase 3 study (V1aduct) were started. Both studies failed to show treatment benefits on the primary endpoint of social communication and interaction (Vineland II 2DC score) and no benefits were seen on the secondary endpoints.

This largest drug development program in autism generated a plethora of learnings in different areas of clinical development such as study design and conduct, choice of endpoints, quality monitoring, as well as participant population and insights into placebo response in autism. The Balovaptan learnings directly impacted the design and conduct of the Aurora Borealis trial. This ongoing phase 2 study investigating the efficacy, safety, tolerability, and pharmacokinetics of Alogabat (RO7017773), a GABA-A α5 receptor modulator, in autistic participants aged 15-45 years.

Objectives:

Share how Balovaptan learnings have informed the clinical trial design and conduct of the ongoing Aurora Borealis study.

Methods:

Data from the three Balovaptan clinical trials were analyzed with regard to critical clinical trial core components including participant eligibility and target population, endpoint strategy, site selection, rater selection and training, as well as the use of biomarkers to identify treatment-sensitive subgroups.

Results:

The Aurora Borealis phase 2 clinical trial (NCT04299464) has implemented several learnings, including the use of highly trained central raters and associated quality monitoring for the primary endpoint (live data monitoring, outlier threshold and erratic rating detection),
flexible remote assessment strategies to reduce subject burden while retaining quality of assessment, and placebo training for caregivers and clinicians. Further, a comprehensive biomarker battery was implemented to identify and further develop treatment-predictive and surrogate efficacy measures.

Conclusions:

Based on observations, analyses and overall learnings of several past studies testing balovaptan in participants in ASD, the Alogabat program was designed to start dissecting the phenotypic and biological heterogeneity of ASD in a clinical drug development program. The Aurora study serves as an efficacy and safety study piloting the use of EEG, neurobehavioral, and digital biomarkers for the further development of Alogabat. Furthermore, the study pioneers a set of measures to better standardize the participant population across geographic regions and to optimize endpoint strategy to ensure high-quality reporting and mitigate potential biases.

415.269 (Poster) In silico and in-Vitro Screening of a Dual Active Ligand That Inhibits HDAC2 and H3R to Rebuild Synaptic Circuitry in Autistic Patients

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Background:

Autism spectrum disorder (ASD) is a lifelong heterogeneous neurodevelopmental disease that can be diagnosed as early as two years old. In the autopsy of the autistic brain, decreased EAAT2 mRNA and protein levels were identified. The EAAT2 is a key astrocytic transmembrane protein to regulate the synaptic glutamate level. Further, HDAC2 is responsible for regulating EAAT2's mRNA and protein levels (1). Additionally, antagonizing the H3R (e.g., famotidine) has also been discovered to have a potential therapeutic role in the management of autistic-like symptoms (2). Because of the disease's mechanistic intricacy, dual molecular targeted therapy is needed. Hence, we identified H3R inhibitor ligands that are computationally effective at binding to the metal-coordinated binding site of HDAC2. In addition, we have also screened the lead molecule potency in invitro using primary astrocytic cell line.

Objectives:

In silico screening of a dual active ligand that inhibits HDAC2 and H3R to rebuild synaptic circuitry in autistic patients

Methods:

Following work-flow was followed:

Protein and ligand structure modeling- The protein crystal structure of HDAC2 was acquired from https://www.rcsb.org/ with the PDB id 5IX0. The receptor grid at the HDAC2 inhibition site was generated using GLIDE. The ligand molecules were acquired from Drugbank (FDA approved library) and individually from PubChem published bioassays of H3R inhibitors in sdf format.

Molecular docking and virtual screening

Final scoring of the virtual screening was achieved using the MM-GBSA binding free energies of the receptor-ligand complexes.

Pharmacokinetic assessment of the hits

The pharmacokinetic evaluations for the hits with high binding affinity were done using SwissADME, admetSAR and Qikprop tool from Schrodinger.

MD simulations and trajectory analysis

The full-scale molecular dynamics simulations were run on Desmond from Schrodinger.

Effect of lead on gene expression

In order to test the effect of lead molecules on EAAT2 expression, we have develop the primary astrocytic cell line from 3 day old pups brain and confirm using GFAP marker. Further, we have synthesized the lead molecules in collaboration with medicinal chemistry department. The gene expression of EAAT2 and HDAC2 were compared with treatment (24hr) and without treatment to primary cell culture using confocal technique.
Hypothesis- Presented in Fig. 1

Results:

The screened lead compounds with PubChem SIDs 103179850, 103185945, and 103362074 showed viable binding with HDAC2 in silico. The proposed H3R inhibitors 103179850, 103185945, and 103362074 were estimated as dual-active molecules to block the HDAC2-mediated deacetylation of the EAAT2 gene and H3R-mediated synaptic transmission irregularity. In addition, we have considered PubChem SIDs 103179850 for in-vitro studies because of its non-toxic and good pharmacokinetic profile. The lead treated cell group showed significant increase in EAAT2 and decrease in HDAC2 gene expression compared to untreated cell group.

Conclusions:

These lead compounds are expected to reduce HDAC2 mediated deacetylation of the EAAT2 gene and concomitantly inhibit H3R mediated detrimental genotypic and phenotypic effects in vitro and in vivo, indicating that they could be used as a therapeutic addition in ASD treatment.

415.270 (Poster) Influence of Repeated Intranasal Oxytocin Administration on Neural Activity during Face Processing in Children with Autism

Background: Rapidly and accurately processing faces and facial expressions is essential for the development of adequate social behaviour, which is often impaired in individuals with autism spectrum disorders (ASD). Intranasal administration of oxytocin (OT) is increasingly explored as a treatment for improving social behaviour, possibly by enhancing the salience of social cues or by reducing social stress and anxiety. However, mechanistic insight in the neural effects of OT, especially the impact of repeated multiple-dose OT treatment, remains largely unexplored.

Objectives: We implemented two complementary neuroimaging techniques (EEG and fMRI) in a multiple-dose OT clinical trial, in order to monitor the immediate and long-term neural effects of OT pharmacotherapy in ASD.

Methods: We performed a randomized double-blind placebo-controlled multiple-dose OT clinical trial (four weeks, 12 IU, twice daily) in 8-to-12-year-old boys and girls with ASD (n=29 OT, n=32 placebo), and assessed effects immediately post-treatment and after a four-week follow-up. Frequency-tagging EEG was used to robustly quantify neural sensitivity for subtle changes in happy and fearful facial expressions. A complementary fMRI face processing task was also administered to gain better understanding on the underlying neural mechanisms. Prior to the intervention we applied the frequency-tagging EEG and fMRI measures in neurotypical (NT) children (n=39), to compare the neural sensitivity of children with ASD with that of NT children.

Results: First, using the frequency-tagging EEG technique, we observed significantly reduced neural sensitivity towards emotional facial expressions in ASD compared to NT controls. Upon nasal spray administration, children with ASD displayed a significant increase in neural sensitivity at the post and follow-up sessions, but only in the placebo group, likely reflecting an implicit learning effect. Strikingly, in the OT group, neural sensitivity remained unaffected from the baseline to the post session, likely reflecting a dampening of an otherwise typically occurring implicit learning effect. At follow-up, four weeks after cessation of the OT treatment, we see an increase in neural sensitivity, comparable to the effect seen in the placebo group.

Secondly, the fMRI results revealed a different pattern of brain activity in ASD compared to NT controls. Children with ASD displayed significantly decreased activity in early visual brain areas and increased activity in the inferior frontal cortex and left amygdala compared to NT controls. Repeated oxytocin administration in ASD did not restore neural activity in these altered regions. However, evidence for an attenuating effect of oxytocin on superior temporal sulcus activity (a core facial expression processing brain region) was found.

Conclusions: First, these findings underline the robustness of frequency-tagging EEG to identify reduced neural sensitivity towards expressive faces in ASD. Secondly, contrary to the general hypothesis that OT may enhance social salience and heighten the reduced neural responses towards facial expressions in ASD, we see that repeated OT administration further attenuates these responses. Possibly, repeated OT administration without explicit social training or context may induce (social) stress reducing effects, thereby also reducing neural sensitivity for socio-communicative cues.

415.271 (Poster) Investigation of Serotonin-Stimulating Drugs Effects on Oxytocin Levels and Brain Activity in Zebrafish Larvae
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Background:

Autism spectrum disorder (ASD) is characterized by deficits in social interactions. Although the condition severely affects 1% of the population worldwide, no pharmacological treatment is available yet. Oxytocin has been proposed to impact and facilitate social processing, and interventions increasing endogenous oxytocin seem to be an attractive alternative to diminish social deficiencies in ASD. Furthermore, serotonin-stimulating drugs have been suggested to decrease social deficits in animal models and in ASD patients – potentially by stimulation of oxytocin release.

Objectives: With the overall goal of developing treatment strategies for social deficits, this study aims to identify drugs that stimulate oxytocin neurons and to identify related neuronal circuits. Specifically, in this study, we investigated whether the serotonin-releasing drugs MDMA and fenfluramine as well as the serotonin receptor agonists buspirone, DMT, LSD and psilocybin stimulate activity of oxytocin neurons and overall brain activity in zebrafish larvae.

Methods: Five-day old transgenic zebrafish larvae, expressing fluorescent proteins in oxytocin-producing cells (oxtl:egfp) were exposed to different drugs shown to elevates human plasma levels of oxytocin. During 1 hour, zebrafish larvae were exposed to 0, 1, 10 or 100 µM of the following drugs: fenfluramine, buspirone, MDMA, DMT, LSD and psilocybin. After 1-hour exposure, fish were euthanized and the samples were prepared for whole mount immunohistochemistry approach using an antibody towards phosphorylated S6, an endogenous sensor of neuronal activation, and tyrosine hydroxylase (TH). The samples were analyzed by confocal microscopy (20X - LSM 710 NLO MP/Confocal, Carl Zeiss). Two brain regions were evaluated - subpallium and preoptic area – areas suggested to be implicated in oxytocin’s actions on social behaviors were evaluated. Imaging analysis was performed by ImageJ software.

Results: No activation of oxytocin cells was observed after drug treatments. However, the serotonin-releasing drugs MDMA and fenfluramine, and the agonists towards the serotonin receptor 2A (DMT, LSD and psilocybin), but not 1A (buspirone), significantly increased pS6 positive cells at subpallium and preoptic area of the zebrafish larval brain.

Conclusions: The results observed here suggest that our immunohistochemical approach using pS6 antibodies can be used to identify and characterize drug-activated neurons in zebrafish larvae. We provide evidence that drugs stimulating the release of serotonin or specifically the 2A receptor activates neurons of the pallium in zebrafish larva.

415.272 (Poster) Mediators of Placebo Response to Cannabinoid Treatment in Children with Autism Spectrum Disorder
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Background: Placebo-response has a substantial impact on treatment outcome with important implications for clinical practice and trials. However, data regarding mediators of placebo-response in children with autism spectrum disorder (ASD) are sparse.

Objectives: To investigate possible mediators of placebo-response among participants of a placebo-controlled trial of Cannabinoid treatment for Behavioral problems in children with ASD (CBA trial).

Methods: We used a specifically designed questionnaire to explore possible mediators of placebo-response in 88 participants of the CBA trial who received placebo and had valid outcome scores. The questionnaire taps 8 domains: parental expectations, child's comprehension of the treatment purpose, previous positive experience with similar treatments (behavioral conditioning), parental locus of control, quality of the patient-physician relationships, recent aggravation of symptoms at baseline, recent fluctuations in symptom-severity at baseline, and adherence to study medications.

Results: Parents of 67 participants completed the questionnaire. Placebo-response was positively associated with the child's comprehension of the treatment purpose (p=0.037). There was also a trend for participants who had a relative aggravation of symptoms before treatment onset to improve following a placebo treatment (p=0.053). All other domains including parental expectations were not associated with placebo-response.

Conclusions: Placebo-response in children with ASD was associated with the child’s ability to understand the treatment purpose. This finding suggests that efforts to explain the treatment purpose to children with disabilities may enhance treatment efficacy in clinical practice and decrease differences in placebo-response between study arms. Contrary to our hypothesis, parental expectations regarding cannabinoid treatment were not associated with placebo-response.
**415.273 (Poster) Overcoming Barriers to Recruitment and Retention in a Placebo Controlled Randomised Controlled Trial of Medication Involving Autistic Adults**

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**Background:** Few large placebo randomised controlled trials (RCTs) for autistic adults have been conducted. They are considered challenging because they rely on uncertainty and blinding of treatments, aspects that can be particularly difficult for autistic people. The STRATA RCT, currently recruiting in UK and Western Australia, aims to assess whether sertraline is an effective and safe treatment for anxiety in adults with autism compared with a placebo. Anticipating recruitment and retention difficulties, we co-produced a programme of qualitative research, in collaboration with a long standing autistic advisory group to explore the views of autistic adults on being invited to an RCT to treat anxiety in both a hypothetical situation (APRiCoT study) and during a real RCT (STRATA).

**Objectives:** The objectives of this qualitative study were to:

- Use the results of a hypothetical study to refine optimal ways to present a real study and refine its protocol.
- Compare the views of those considering participating in a hypothetical RCT with those based on real experiences to investigate how well views align.
- Discuss what we can learn on trial design and conduct RCTs for an autistic population.

**Methods:** We thematically analysed data from in-depth interviews with 49 APRiCoT and 30 STRATA study participants. Interviews explored reasons for accepting or declining trial participation (real or hypothetical), views on the trial process, and experiences and acceptability of medication.

**Results:** We found a strong support for obtaining scientific evidence within the autistic community, especially for effective treatments for anxiety. We confirmed pre-trial hesitancy about taking trial medication because of experiences of autistic people developing atypical responses to commonly prescribed medications, reactions that may not be acknowledged or addressed by healthcare professionals. Design suggestions for RCTs included a bespoke safety check system to reassure individuals as well as a preference for online over face-to-face contact. Adjustments to the design of the RCT following feedback from participants in APRiCoT were recognised and appreciated by participants in STRATA. Length of blinding in the hypothetical trial produced divergent views amongst interviewees, yet retention in the real trial has been better than expected to date.

**Conclusions:** Whilst hypothetical studies are useful to understand views and possible actions in healthcare scenarios, continuing co-production with research partners provide anchorage when faced with real situations. This methodology will contribute to improving the conduct of ongoing and future RCTs so that they are more appropriate and inclusive, enabling robust treatment effectiveness in this under-served population to be determined.

**415.274 (Poster) Post-Treatment Gains in Social Gaze, Cognitive, and Behavioral Outcomes during a Combination Oxytocin-Social Skills Training Intervention**

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**Background:** Social Skills Training (SST) groups are a widely used treatment modality with several randomized clinical trials (RCTs) showing improvements on social competence in autistic youth. Recently, studies of neural plasticity provide evidence that some SST groups have the potential to shift neural and gaze patterns to reflect those found in non-autistic youth. These findings reflect the significant neural restructuring that occurs starting around age 10 in non-autistic youth within brain networks supporting higher-order cognitive functions (e.g., attention and motivational processes critical to fostering peer social relationships). The current study seeks to extend the SST research on putative behavioral and cognitive mechanisms supporting neural plasticity in older autistic youth. Specifically, this study applies oxytocin augmentation of a SST group curriculum, which has been shown to increase recruitment of social-cognitive circuitry and improve proximal behavioral endpoints.

**Objectives:** The primary goal of this pilot RCT (Clinicaltrials.gov: NCT02918864) was to evaluate the potentiating effects off intranasal oxytocin (INOT) during a cognitive-behavioral group intervention targeting social-cognitive skills in school-aged children with autism.
Predictors of Placebo Response in Three Large Clinical Trials with the V1a Receptor Antagonist Balovaptan in Autism

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Background:

There are no approved pharmacotherapies for the core symptoms of autism. High rates of placebo response, which limit the statistical capacity to identify treatment differences, are increasingly implicated as a factor in failed autism clinical trials. However, there have been limited studies of the predictors of placebo response in autism.

Objectives:

To identify baseline predictors of placebo response and quantify their influence on clinical scales of interest for three, large, harmonised randomised clinical trials of balovaptan, a V1a receptor antagonist.

Methods:

Analyses comprised data from autistic children and adults assigned to placebo in three randomised controlled trials of balovaptan (VANILLA [NCT01474278], V1aduct [NCT03504917] and aV1ation [NCT02901431]). A two-step approach was used to identify predictors of placebo response on the Vineland-II two-domain composite (2DC; primary outcome in aV1ation and V1aduct and a caregiver measure) and Clinical Global Impression scales (CGI; secondary outcome and a clinician measure) at Week 12 and 24 separately. The candidate predictor set included baseline demographics (age, sex, IQ, body mass index [BMI]), baseline clinical scales (Social Responsiveness Score-2, CGI – Severity, Vineland-II socialisation and communication standard scores, Pediatric quality of life inventory™ family impact total score, RepetitiveBehavior Scale – Revised [RBS-R] subscale scores), concomitant medication and comorbidity. Site-specific factors such as commercial versus academic sites and number of participants enrolled were also considered. Step 1 identified influential predictors of placebo response using Least Absolute Shrinkage and Selection Operator (LASSO) regression while Step 2 quantified the influence of predictors via linear regression. Results were validated through statistical bootstrapping approaches with 500 replications of the analysis dataset.

Results:

The pooled participant-level dataset included individuals with autism aged 5–62 years (mean age 21 [SD 10]), among which 263 and 172 participants received placebo at Weeks 12 and 24, respectively. No influential predictors were identified for the CGI scale. At Week 12, increased placebo response on the Vineland-II scale was predicted by commercial versus academic sites (adjusted estimate 4.31; 95% CI
1.48, 7.13; p=0.003), higher dropout rate per site (8.95; 95% CI 0.55, 17.34; p=0.037), higher baseline RBS-R compulsive (0.58; 95% CI 0.05, 1.11; p=0.033), attention deficit hyperactivity disorder (3.71; 95% CI 0.51, 6.92; p=0.023) and depression (4.50; 95% CI 1.43, 7.57; p=0.004). At Week 24, increased placebo response was predicted by higher baseline RBS-R compulsive (0.78; 95% CI 0.17, 1.40; p=0.010) and higher RBS-R ritualistic (0.71; 95% CI 0.00, 1.42; p=0.050). In contrast, decreased placebo response at Week 12 and Week 24 was predicted by higher baseline Vineland-II 2DC (Week 12: –0.23; 95% CI –0.31, –0.14; p<0.001; Week 24: –0.32; 95% CI –0.44, –0.19; p<0.001). Additional factors associated with decreased placebo response at Week 24 included participants being recruited from EU versus US sites (–6.57; 95% CI –12.73, –0.42; p=0.040) and higher baseline BMI (–0.27; 95% CI –0.51, –0.03; p=0.020).

Conclusions:

Outside of meta-analyses, this study represents the largest initiative investigating placebo response in autism. Identification of these predictors of placebo response may help with anticipating and potentially mitigating placebo response in drug development efforts in autism.

**415.276 (Poster) Role of ORAL Probiotics in Children with Autism Spectrum Disorder: A Randomised Double Blind Placebo Controlled Trial**

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Background: Probiotics are live micro-organisms which can provide health benefits on the host when administered in adequate amounts. It has been proposed that probiotics may reduce the inflammatory state and modulate the gastrointestinal and behavioral symptoms in ASD via gut brain axis.

Objectives: To study the efficacy of add-on oral probiotics to standard treatment in improving core symptoms of Autism Spectrum Disorder(ASD)

Methods: In this ongoing randomised double-blind placebo-controlled trial, a total of 100 children(50-each group), age 2-18 years, fulfilling DSM V for ASD and on standard treatment for <12 weeks have been enrolled. Children with ASD suffering from chronic systemic illness, receiving standard treatment for ≥12 weeks, have received any alternate treatment in past 12 weeks or allergic to any known component of probiotics were excluded. *Lactobacillus rhamnosus*, *Lactobacillus plantarum and Bifidobacterium longus subsp infantis* in the dose of 1 billion CFU/g (Total=3*10⁹) as probiotic, was started along with standard treatment in the intervention group whereas control group received only standard care. Probiotics were given as 1 sachet/day, daily for 24 weeks. Outcome was assessed based on Childhood Autism Rating Scale (CARS), Autism Behaviour Checklist (ABC), Childhood Behaviour Checklist (CBCL), Development Profile 3 (DP3), Child Sleep Habit Questionnaire (CHSQ) and Sensory Profile 2; at 12 and 24 weeks in both the groups. fMRI Brain was done in a subset of patients in both the groups, and stools samples were collected and analysed for individual pathogenic and non-pathogenic microbial flora, along with fetal propionic acid.

Results: Out of the total 100 children enrolled, average age at enrolment was 5.4(2.6) years with an average age at diagnosis of 48 months(18-132 months). 25% of the children were receiving risperidone as a part of standard treatment whereas 63% were not on any medications. The mean CARS, ABC, CSHQ score at baseline was 36.69(+4.9), 73.7(+16.9), 33.1(+11.9) respectively. Sensory Profile scores were assessed under following domains: Seeking[61.6/95(+11.8)], avoiding[62.15/100(+10.2)], sensitivity[62.7/95(+11)], registration[57.5/110(+13.20)], auditory[25.8/40(+6.2)], visual[16.2/30(+4.6)], touch[32.5/55(+8.6)], movement[23.17/40(+5.7)], body position[16.9/40(+6.3)], oral[31.8/50(+8.9)], conduct[29.7/45(+6.9)], socioemotional[42.2/70(+7.4)] and attentional[36.3/50(+6.9)]. On CBCL, features of pervasive developmental disorder and being withdrawn were seen in all the children, associated inattention and hyperactivity was seen in 77% of them. 55.5% of the children were graded as mild- moderate ASD and 44.5% were severely autistic(CARS≥37). Most of the children had associated comorbidities, and on evaluation 97% of children had intellectual impairment, 98%-stereotypies, 46%-agression, 37%-constipation, 10%-epilepsy, 8%-feeding disorder, 7%-motor disorder, 3%-obesity, 1%-adolescent issues, 4%-anxiety disorder, 5%-mood disorder, 16%-ADHD, 12%-disruptive behaviour and 24% had OCD as associated co-morbidities. The average change in CARS and ABC at 12 and 24 weeks is 1.5 (0 - 9.5), 2 (0 - 9.5) and 2 (0 - 25), 3 (0 - 25) respectively. Significant reduction in complaints of constipation was seen in follow up at 24 weeks from 37% at baseline to 6%. One child had complaint of seizure while on therapy. No other side effects were noted.
Conclusions: Significance of change in scores and outcome will be assessed after the detailed analysis at the end of the study.

**415.277** (Poster) Testing a Mechanism-Based Treatment Candidate Using a Multiple n-of-1 Design: Bumetanide for Developmental Disorders (BUDDI) Trial

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Background: Bumetanide is an example of a potential mechanism based treatment option for autism spectrum disorder that has been tested with mixed results in part due to multifaceted heterogeneity. We previously performed three trials in children using varying strategies to identify responsive subsets to bumetanide [1,2,3]. The completed trials indicated effectiveness of bumetanide in improving repetitive and irritable behavior in subsets of participants. Furthermore, we developed a strategy to identify responsive individuals using a combination of EEG biomarkers and behavioral measures [4]. Here, we present the first clinical results of an innovative trial multiple n-of-1 follow-up trial.

Objectives: To validate previous effects and improve clinical endpoints, we performed a series of single-case experimental designs (SCEDs) including physiological, cognitive and behavioral measurements.

Methods: A SCED is an N-of-1 design in which a baseline period is compared to an intervention period, evidence of treatment effect is based on demonstrating that the change in behavior only occurs during intervention versus a randomized baseline period. We performed SCEDs in participants aged 7-18 years with the ability to comply to trial procedures who received 6 months bumetanide treatment under repetitive evaluation of multiple endpoint domains using patient reported outcome measures (PROMs; weekly), conventional questionnaires (3 monthly), resting state EEG measurements (monthly) and an in house-designed battery of computerized tests to measure neurocognitive functions (3 monthly).

Results: In the first series of 40 completed SCEDs 82% of participants experienced a positive change during the treatment period. In all cases this improvement was substantiated by either behavioral, physiological or cognitive improvement. 30 participants showed a positive change in both conventional behavioral outcomes and PROMs, with the majority (80%) showing a change of more than 10 points on the ABC scale and 70% showing a change of more than 5 points on the RBS scale. Of the 33 participants able to perform the cognitive measurements 12 showed a significant change in one or more cognitive domains, of which 92% also experienced a clinical change.

Conclusions: In this first evaluation of the BUDDi trial n-of-1 trials we show applicability of PROMs as specific endpoints and replicate previous effects on repetitive and irritable behavior that seem associated with cognitive effects. Together, these results indicate utility for SCED based n-of-1 designs to test mechanism-based treatments in heterogeneous NDD populations.

References


**415.278** (Poster) The Efficacy of Vivomixx Probiotic for Autistic Children with Persistent Gastrointestinal Symptoms: A Randomised Placebo-Controlled Double-Blind Crossover Study

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Background:
There is wealth of research demonstrating bidirectional communication between the human gut microbiota and the brain. There is a high prevalence of gastrointestinal (GI) symptoms in autistic children (47%) compared to not-autistic children and these symptoms persist for an extended period of time for a large proportion of autistic children. Research has indicated that the presence and severity of GI symptoms are related to the degree of autistic traits and the levels of anxiety and sensory over-responsivity. Evidence of benefit from the use of probiotics in autistic children is promising but limited: There have only been six studies of probiotics for autistic children and all suffer from methodological issues including small sample size and lack of blinding. However, overall the research is increasingly indicating that treating GI symptoms in autistic children should bring benefits beyond improvements in gastrointestinal symptoms.

Objectives: To assess the efficacy of Vivomixx probiotic on GI symptoms and global function in autistic children

Methods:

A randomised double-blind placebo-controlled crossover trial of Vivomixx probiotic was conducted for autistic children aged 3-14 years with at least one persistent gastrointestinal symptom. 69 participants were enrolled (57 boys) and each participant becomes their own control. All participants had a confirmed diagnosis of autism and the group included those with additional challenges including learning disability and minimal verbal communication. Participants were randomly assigned to either receive placebo for 12 weeks followed by Vivomixx for 12 weeks or vice versa, with a 4 week break in-between to eliminate any carry-over effect. Outcome measures included the Autism Treatment Evaluation Checklist, the Gastrointestinal History questionnaire and the Aberrant Behaviour Checklist and were collected at enrolment (T0), after the first 12-week treatment (T1) and after the second 12-week treatment (T2). The change in outcome measures from T0 after Vivomixx was compared to the change from T0 after placebo.

Results:

Vivomixx was not found to improve global function or reduce the frequency of gastrointestinal symptoms in this heterogeneous group. A subgroup of participants (n=22) displayed a notable improvement in global function following treatment with Vivomixx but post-hoc correlation analysis did not isolate any characteristics that identified these from the rest of the participants.

Conclusions:

The results of this clinical trial for autistic children with persistent gastrointestinal symptoms adds to the evidence regarding probiotic use in this group. As a crossover study with 69 enrolled participants, we believe it is the largest autism probiotic study yet reported. The results confirm the safety of Vivomixx in this patient group. As a randomised double-blind placebo-controlled trial, a significant treatment effect was not found in the group as a whole, which is contrary to published open studies and this highlights the importance of robust design for future studies. The identification of a subgroup that experienced a notable improvement in global function after Vivomixx treatment, suggests that further research with a more tightly defined subgroup may show positive results. Given the low risk of probiotic intervention and the high prevalence of gastrointestinal symptoms in autistic children, this warrants further research.

## References

415.279 (Poster) Use of Medication in Persons with Autism Spectrum Disorder: First Results of a National Study


Background: In Italy, Autism spectrum disorder (ASD) prevalence data are based on regional information systems: in Emilia-Romagna and Piedmont, in the age group 0-17 years, the prevalence of ASD was estimated at 3.9 and 3.8 per thousand, respectively. There are currently no pharmacological treatments available for the 'core' symptoms of ASD but, in view of the presence of neurological and psychiatric co-occurring conditions in this population, the prescription of antidepressant and antipsychotic drugs is frequent.

Objectives: The National Institute of Health evaluated the use of drugs with particular regard to those for the Central Nervous System (CNS) in a cohort of subjects with ASD identified through current health sources.

Methods: The Emilia Romagna, Umbria, Abruzzo and Sardinia regions participated in the first phase of the project. The study population consisted of children born in the period 2000-2016 and ASD cases were defined on the basis of the first hospital admission with a principal or secondary diagnosis of ASD (International Classification of Diseases [ICD-9-CM] 299.x) and aged more than one year at the index event. A maximum of three controls were matched to each case by year of birth, sex and treating physician. For both ASD and controls, all pharmaceutical prescriptions paid for by the National Health Service dispensed in the 24 months following the index event were retrieved (for controls, the starting date of the observation period corresponds to the date of the index event of the relevant case). Analyses were conducted in terms of prevalence of use and quantity of drugs prescribed (number of prescriptions and packages) stratified by age group, therapeutic category, and active ingredient.
Results: 1,950 ASD and 5,827 controls aged between 1-17 years were included, with greater representation of males (80%) and the age group between 1-5 years (66%). The prevalence of drug use was 84.3% in ASD and 76.3% in controls, with a decreasing gradient by age: 86% between 1-5 years and 82% after 6 years for ASD and 80% between 1-5 years and about 68% after 6 years in controls. About one third of ASD and controls received >5 substances in the two years following the index date (definition of polypharmacy). CNS drugs account for 38% of the packages prescribed to ASD and only 6% in controls, reaching a maximum of 75% in ASD aged 12-17 years. As expected, the other categories with the highest use are antibacterial drugs (ASD: 32.3%, controls: 47.4%) and respiratory drugs (ASD: 13.8%, controls: 26.0%). Atypical antipsychotics (particularly risperidone and aripiprazole) and typical antipsychotics are the most prevalent psychotropic drugs in ASD (5.9% and 1.3% respectively), followed by 0.9% by SSRI antidepressants; in controls prevalence of these categories is less than 1%. 0.4% of ASD show symptoms attributable to ADHD treated with methylphenidate.

Conclusions: The present analyses characterized the prescribing pattern in individuals with ASD with particular regard to CNS pharmacological treatment. Pharmacological treatment must however be considered in a broader framework and seen as a possible component of a set of interventions that also includes non-pharmacological interventions.

415.280 (Poster) A Personalised Medicine Approach to Evaluating Therapies for Autistic Children: The Example of Oxytocin
A. J. Guastella, Brain and Mind Centre and Children's Hospital Westmead, Sydney, NSW, Australia

Background: There is growing interest in the use of personalised medicine to inform clinical trials for autism therapies. Despite this, personalised approaches in clinical trials remain in their infancy. Oxytocin is a hormone and neuropeptide that has been administered as a nasal spray to influence social cognition and behaviour. A series of administration studies have produced mixed findings to support use in autistic people. It is clear that a personalised medicine approach is now needed to understand whether there are therapeutic benefits of oxytocin to autistic people. The presenter has published a number of these studies that have produced mixed results. This includes a recent study that suggested that oxytocin may have benefits for younger autistic populations to social responsiveness.

Objectives: The presenter will provide an overview of personalised medicine approaches that can be used in autistic populations. The presenter will also present unpublished data utilising a personalised medicine approach to understand whether oxytocin can produce benefits for some autistic children.

Methods: 87 young autistic children completed a randomized controlled trial of oxytocin nasal spray with a placebo lead-in. They also completed a range of measures aimed at identifying objective markers of response to intervention. Data will be presented showing how clinical trial designs and new technology developed by this research team was used to enhance the evaluation of responses to intervention.

Results: The study showed that younger children showed improved social responsiveness following daily oxytocin nasal administration. A series of analyses are then conducted showing markers of response in sub-populations. This included the using a comprehensive range of technology-driven observational, physiological, biological and cognitive phenotypes to predict change. It is also clear that both modified trial designs and objective markers were needed to account for the placebo response. The results of this analysis will be presented at the time of presentation.

Conclusions: Autism is a heterogenous condition with a range of factors that impact presentation, with relevance for sub-typing response to intervention. Oxytocin has potential to improve social responsiveness, but targeted methods are needed to ensure those that receive the therapy will benefit. This study supports the potential of novel clinical trial designs and objective biomarkers to sub-type autistic individuals so that those who receive therapies are more likely to benefit.
individuals across a wide range of ages (2-21 years) with developmental disabilities, focusing on autism, with severely delayed to above average cognitive functioning. Speakers will present novel research exploring (1) advancements in assessments, prevalence estimates, and clinical predictors of aggressive behavior in early childhood; (2) psychiatric profiles of autistic school-aged youth with aggression; (3) interacting effects of risk factors in youth with genetic mutations related to autism; and (4) outcomes for a parent training intervention targeting challenging behaviors in a community setting. This panel presents a translational perspective on aggressive behavior in youth with developmental disabilities.

222.001 (Panel Discussion) Aggression and Its Relation to Emotional Reactivity in Preschoolers with and without Neurodevelopmental Delays

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Background: Relative to the general population, children with developmental disabilities (DD) including autism spectrum disorder (ASD) display higher rates of emotion dysregulation (ED) challenges and aggression, placing them at an increased risk for psychiatric and behavioral problems. Yet, little is known about the relationship between ED and aggression in early childhood among children with ASD/DDS. Moreover, few standardized tools have been utilized to comprehensively assess the topography of aggressive behaviors in a large non-referred preschool-aged sample, which are critical to informing tailored targets for early intervention.

Objectives: To evaluate the prevalence of parent-reported aggressive behaviors in a large sample of preschool children with ASD/DDs relative to the general population, and to identify clinical predictors of aggression, including considering the contribution of emotional reactivity to aggression in this population.

Methods: Parents of 1068 children with ASD/DDs (“clinical sample”) and 690 children without DDs (“general sample”) between 2-5 years were recruited through the Simons Powering Autism Research (SPARK) registry and the local community. Parents completed the Aggression subscale of the Multidimensional Assessment of Preschool–Disruptive Behavior (MAP-DB), a caregiver-report measure that distinguishes developmentally appropriate from clinically significant challenging behaviors in the general population using an objective frequency scale, the Reactivity subscale of the Emotion Dysregulation Inventory-Young Child (EDI-YC), a newly-developed measure of ED severity validated for preschoolers with and without DDs, and the Social Communication Questionnaire (SCQ). Frequency of aggressive behaviors over the previous month were compared between groups using chi-square analyses and odds ratios. A hierarchical multiple regression was run to determine if the addition of autism traits and emotional reactivity improved the prediction of total aggression scores over and above group (clinical vs. general sample).

Results: Overall, parents of children in the clinical sample (74% with ASD; Table 1) endorsed significantly more frequent aggressive behaviors than those in the general sample on most MAP-DB-Aggression items, with frequent behaviors (defined as “most days”, “every day,” or “multiple times per day”) occurring in up to 18% of the clinical sample versus up to 7% of the general sample (Table 2). Notably, the general sample patterns were comparable to previous community samples, underscoring robustness of distinction from clinical patterns. Children with ASD/DDs were 6 times more likely than those without ASD/DDs to frequently hit, shove, kick, bite, or pinch when frustrated, angry, or upset” and “hit, shove, kick, bite, or pinch other adults.” The full regression model including group, autism traits, and reactivity predicting aggression scores was statistically significant, $R^2=.314$, $F(3, 1746) = 266.58$, $p<.0001$; adjusted $R^2= 313$. The addition of SCQ and reactivity led to significant increases in $R^2$ of .068 and .192, respectively, $ps<.0001$.

Conclusions: These findings suggest that children with ASD/DDs have greater difficulties with ED and aggression compared to children without DDs; however, this effect may be mediated by their greater emotional reactivity. These findings extend the literature on ED among older youth with ASD/DDs and may be indicative of atypical emotional development in early childhood, emphasizing a need for early emotion regulation interventions in preschoolers with ASD/DDs.

222.002 (Panel Discussion) Identification of Four Clusters with Distinct Emotional and Behavioral Presentations in a Large, Representative Sample of Autistic Youth: The Influence of Emotional Reactivity and Aggression

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Background:

Accumulating research suggests that autistic individuals are at high risk for emotion dysregulation, aggression, self-injurious behavior, depression, and anxiety. It is common for autistic individuals to present with multiple forms of emotional or behavioral difficulties, which can severely affect their daily life activities, decrease quality of life, and increase the use of restrictive interventions or hospitalization. Therefore, there is a growing interest in understanding how emotional and behavioral symptoms cluster together within individuals, a
critical gap given the marked heterogeneity within the autism spectrum in emotional and behavioral presentation. Identifying subgroups with similar presentations would be helpful for identifying underlying mechanisms and developing treatment approaches.

**Objectives:** The study aimed to: 1) utilize a machine learning clustering technique to identify subgroups of individuals within the autism spectrum with similar emotional and behavioral presentations and 2) determine which features most strongly inform clustering decisions.

**Methods:** The sample (total n = 1,609) included 558 psychiatrically hospitalized autistic youth from the Autism Inpatient Collection (age 12.7± 3.6), and 996 autistic youth from the Interactive Autism Network (IAN) autism research registry (age 11.9 ± 3). We applied a machine learning clustering technique to item-level parent report data from the Emotion Dysregulation Inventory (EDI) Reactivity (24 items) and Dysphoria (6 items) scales, three self-injurious behavior items from the Aberrant Behavior Checklist (ABC), and items from the Anxious/Depressed, Withdrawn/Depressed, and Aggression scales of the Child Behavior Checklist (CBCL; 39 items). Follow-up analyses were performed to identify significant differences between clusters as well as which scales and items were most informative for cluster membership.

**Results:** The clustering algorithm produced four distinct groups of individuals, as shown in Figure 1. A one-way ANOVA test showed that all pairwise comparisons of the four clusters have significant mean differences. As seen in Figure 1, the EDI Reactivity and CBCL Aggression scales are directly proportional. Furthermore, although the fourth group shows moderate levels across all scales, the first and second groups show higher levels of EDI Dysphoria, CBCL Anxiety and Withdrawn scales than the EDI Reactivity and CBCL Aggression scales. The third group shows the opposite pattern: higher levels of EDI Reactivity and CBCL Aggression scales than the other scales. We ran a feature importance test to assess the importance of each scale and each item within the scale. The results showed that both EDI Reactivity and CBCL Aggression items contributed most to the clustering decision, followed by EDI Dysphoria; an item level feature importance test resulted in similar conclusions.

**Conclusions:** This study provides insights into the underlying similarities between autistic youth based on parent report data related to emotional and behavioral presentation to aid in identifying underlying mechanisms and developing treatment approaches. Results suggest that presence of emotion dysregulation and aggression contribute significantly in determining the cluster membership and the pattern between the emotional and behavioral presentation across these clusters. Next steps will include the identification of non-clustering variables that explain variance in cluster membership.

**222.003 (Panel Discussion)** Interacting Risk Factors for Aggression in Individuals with Rare Variants in ASD-Associated Genes

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**Background:** IQ, ASD traits, and executive functioning (EF) have been separately linked to aggression in autistic youth. However, we know little about the interaction of risk factors for aggression, particularly in individuals with high-confidence ASD genes with a range of cognitive functioning. Understanding the development of aggression can inform clinical practice and research on mechanisms of change in those interventions.

**Objectives:** We evaluate executive functioning as a moderator in the relation among Verbal IQ (VIQ), Nonverbal IQ (NVIQ), and ASD traits with aggressive behavior in youth with high-confidence ASD genes and in youth and in autistic youth without known genetic mutations.

**Methods:** Enrollment is ongoing for families with rare pathogenic variants associated with ASD (current n=92) and families with ASD without rare variants (current n=61) completed extensive clinical phenotyping through in-person, in-home, and/or virtual methods. All children had diagnoses of ASD and 46.2% had intellectual disability. The majority of the sample were male (76.8%) and ages ranged from 4 to 21.67 years (M=11.69, SD=3.81). IQ was assessed using the Differential Abilities Scale, 2nd Edition, autism traits were assessed using the Social Responsiveness Scale, 2nd Edition, EF was assessed using the Behavior Rating Inventory of Executive Functioning Global Executive Functioning index, and aggression was assessed using the Aberrant Behavior Checklist Irritability Subscale. Group was analyzed as a covariate but not significant and not included for parsimony.

**Results:** Individuals with and without identified rare genes did not differ on severity of aggression (t(166)=-.51, p=.609). Clinically significant levels of aggression were present in 13.7% of the sample. There were main effects of VIQ (B=.05, SE=.02, p=.040) and EF (B=.13, SE=.04, p=.001) on aggression, but these factors did not interact. Similarly, EF did not moderate the relation among NVIQ and aggression, despite significant main effects of NVIQ (B=.06, SE=.02, p=.010) and EF (B=.13, SE=.04, p=.001). Again, while there were main effects, EF also did not moderate the relation among restricted repetitive behaviors with aggression (B=.005, SE=.004, p=.190) or among social-communication skills and aggression (B=.005, SE=.004, p=.182). As only main effects were identified, exploratory multiple

**Conclusions:** The study aimed to: 1) utilize a machine learning clustering technique to identify subgroups of individuals within the autism spectrum with similar emotional and behavioral presentations and 2) determine which features most strongly inform clustering decisions.

**Methods:** The sample (total n = 1,609) included 558 psychiatrically hospitalized autistic youth from the Autism Inpatient Collection (age 12.7± 3.6), and 996 autistic youth from the Interactive Autism Network (IAN) autism research registry (age 11.9 ± 3). We applied a machine learning clustering technique to item-level parent report data from the Emotion Dysregulation Inventory (EDI) Reactivity (24 items) and Dysphoria (6 items) scales, three self-injurious behavior items from the Aberrant Behavior Checklist (ABC), and items from the Anxious/Depressed, Withdrawn/Depressed, and Aggression scales of the Child Behavior Checklist (CBCL; 39 items). Follow-up analyses were performed to identify significant differences between clusters as well as which scales and items were most informative for cluster membership.

**Results:** The clustering algorithm produced four distinct groups of individuals, as shown in Figure 1. A one-way ANOVA test showed that all pairwise comparisons of the four clusters have significant mean differences. As seen in Figure 1, the EDI Reactivity and CBCL Aggression scales are directly proportional. Furthermore, although the fourth group shows moderate levels across all scales, the first and second groups show higher levels of EDI Dysphoria, CBCL Anxiety and Withdrawn scales than the EDI Reactivity and CBCL Aggression scales. The third group shows the opposite pattern: higher levels of EDI Reactivity and CBCL Aggression scales than the other scales. We ran a feature importance test to assess the importance of each scale and each item within the scale. The results showed that both EDI Reactivity and CBCL Aggression items contributed most to the clustering decision, followed by EDI Dysphoria; an item level feature importance test resulted in similar conclusions.

**Conclusions:** This study provides insights into the underlying similarities between autistic youth based on parent report data related to emotional and behavioral presentation to aid in identifying underlying mechanisms and developing treatment approaches. Results suggest that presence of emotion dysregulation and aggression contribute significantly in determining the cluster membership and the pattern between the emotional and behavioral presentation across these clusters. Next steps will include the identification of non-clustering variables that explain variance in cluster membership.
Background:

Up to half of autistic children exhibit challenging behaviors, including tantrums, defiance, and aggression (Brown et al., 2019). Without intervention, these behaviors interfere with child and family quality of life, including child academic, adaptive, and social functioning, as well as parent stress and community engagement (Mazurek et al., 2013). Research Units in Behavioral Interventions (RUBI) is a low-intensity, manualized intervention for parents of children with ASD and co-occurring challenging behavior. Although the results of three large scale trials have shown that RUBI significantly decreases child challenging behavior, RUBI has yet to be implemented and tested in community settings (Bears et al., 2015). Additionally, although moderators of treatment response have been tested in previous trials of RUBI, they have not been examined in a community context (Lecavalier et al., 2017). The identification of moderators may provide insight on subgroups that may be more or less likely to respond to an efficacious treatment delivered in a real-world setting.

Objectives:

The aims of the current study were to: (1) evaluate the effectiveness of RUBI on challenging behaviors in autistic youth in a community setting; and (2) examine baseline moderators of treatment response in this sample.

Methods:

Participants were 189 autistic children (ages 2-13), who were referred for treatment for challenging behaviors, and their caregivers. Sessions took place at two large community-based autism centers. Participants in this sample were more demographically diverse than in previous RUBI trials (e.g., 15% Hispanic, IQ 45-136). Parents received twelve sessions of RUBI on average, which were delivered by both doctoral-level and graduate student clinicians. Challenging behaviors were measured via the Aberrant Behavior Checklist Irritability Subscale (ABC-I) and the Home Situations Questionnaire (HSQ) at pre-, mid-, and post-treatment, and again at a one-month follow-up. Our team selected a priori demographic and clinical variables as moderators that could have a prognostic influence on outcomes: parenting stress (measured by the Parenting Stress Index (PSI)), IQ (measured by the Stanford-Binet 5 (SB-5)), and child anxiety (measured by the Multidimensional Anxiety Scale for Children 2 (MASC-2)).

Results:

The first aim was investigated using multi-level modeling to fit data to specific models to test distinct growth trajectories from pre- to post-intervention (Hox, 2010). There were significant decreases in ABC-I scores from pre- to mid-intervention ($\beta=5.32$, $p<.001$), post-intervention ($\beta=8.82$, $p<.001$), and follow-up ($\beta=9.10$, $p<.001$). There were also significant decreases in HSQ scores from pre- to mid-intervention ($\beta=0.77$, $p<.001$), post-intervention ($\beta=1.43$, $p<.001$), and follow-up ($\beta=1.76$, $p<.001$). Moderators (parenting stress, IQ, and child anxiety) were then added to the models and main effects and interactions were examined. Moderation analyses were not significant.

Conclusions:

Results from this study support the effectiveness of the RUBI parent training program for children with autism and challenging behaviors in community-based clinical practice. Key baseline characteristics did not moderate treatment outcomes, suggesting that RUBI is likely to benefit a wide range of children with autism and disruptive behavior. Further examination of the purposeful implementation and sustainment of RUBI in broader and more geographically diverse community settings is indicated.
Autism co-occurs with various neuro-psychiatric conditions. Over the last few years, the co-occurrence of autism with post-traumatic stress disorder (PTSD) has gained more research attention. Studies have shown that PTSD is much more common in autism than in typical development, and that it is often associated with adverse social experiences. The current panel brings together an international collection of researchers to advance our understanding of the triggers, the clinical manifestation, and the mechanisms underlying autism-PTSD co-occurrence. Connor Kerns will present findings on the Childhood Adversity and Social Stress questionnaire, which was especially designed to examine trauma triggers and traumatic symptoms in autistic children and youth. Arvid Kildahl will present findings on the clinical and behavioral characteristics of autistic adults with intellectual disabilities, and how despite these features, PTSD is underdiagnosed by mental health professionals. Freya Rumball will present results of an international longitudinal study which examined traumatic experiences of autistic vs. non-autistic adults resulting from the COVID-19 pandemic. Finally, Danny Horesh will offer a fresh look on social cognition as a mechanism underlying autism-PTSD co-occurrence, and on how being more aware of social cues could actually expose autistic individuals to more traumatic stress.

**229.001 (Panel Discussion) Psychometric Properties of the Childhood Adversity and Social Stress (CASS) Questionnaire, Parent Report Version: A Trauma Measure Tailored for Autistic Youth**

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Background: Research suggests autistic youth are more likely than non-autistic youth to experience childhood adversity and traumatic reactions. However, studies have relied on measures neither designed nor validated for autistic populations, a limitation given evidence of distinct sources and expressions of trauma in this group. To address this, we used a mixed-method approach to develop an autism-tailored tool, the Childhood Adversity and Social Stress (CASS) questionnaire, with self and parent-report versions. An extensive literature review, qualitative interviews with autistic adults and caregivers and Delphi poll of experts in autism and childhood trauma generated and refined CASS items. The measure included traditional (e.g., maltreatment) and autism-related adversities (e.g., stigma, sensory-related distress) as well as symptoms identified as “important indicators” of trauma in autistic youth (with varied language) by expert consensus. Notably, symptoms are only queried if a traumatic event (TE) is reported (i.e., parent endorses ≥1 past adversity that (a) upset the child for more than a few weeks and (b) still upsets them currently).

Objectives: To assess the psychometric properties of the parent-report CASS.

Methods: Parents of 749 autistic children ages 8–17 years old (80.1% male; Mage(SD)=13.09(2.69); 85.1% White) with communicative phrase speech were recruited via the Interactive Autism Network. They completed the CASS along with sociodemographic questions, a parent-reported Child PTSD Symptom Scale (CPSS) and Short Sensory Profile (SSP) online. Data analysis included: descriptive statistics of the CPSS items, confirmatory factor analysis and exploratory structural equation modeling (ESEM; which allows cross-loading of items) of the CASS symptoms with 4-factor (DSM-based) versus 5-factor (Dysphoric Arousal) PTSD models. Last, we examined correlations between the CASS, CPSS and SSP total scores and compared PTE types and totals in those endorsing v. not endorsing a TE (as defined above).

Results: Endorsement of adversities ranged from 2.4% (sexual abuse) to 64.0% (sensory distress). Stigma, death of a loved one, bullying, changes in routine, and chronic social confusion were also common (see Table 1). These items were also the most common in participants with a TE (n=298), who had approximately twice as many total adversities, M(SD)=6.37(3.26) as those without a TE, (M(SD)=3.42, (2.33), t(489)=13.55, p<.001. Significant correlations between the CPSS and CASS adversity subscales (R=.63, p<.001) and CPSS and CASS symptom subscales (R=.63, p<.001) supported convergent validity. CASS symptoms were also significantly associated with the SSP total (R=.403, p<.001), but this relationship was significantly weaker than that between CASS and CPSS symptoms (Z=–3.65, p<.001), supporting discriminant validity. We found the PTSD dysphoric arousal five-factor ESEM model had the best fit, X(148) = 242.97, CFI=.98, TLI=.97, RGMMA=.046 (CFI: .036 - .057), SRMR=.03.
Conclusions: Results suggest the parent-report CASS is a valid measure of adversities and traumatic reactions in autistic youth. Further, we found the latent structure of symptoms was consistent with a 5-factor dysphoric arousal model of PTSD. Further research is needed to extend these findings in samples with enhanced gender and racial diversity, and to evaluate the self-report CASS, as multi-informant accounts will likely enhance sensitivity.

229.002 (Panel Discussion) Posttraumatic Stress Disorder in Autistic Adults with Intellectual Disabilities: Under-Recognized and Underdiagnosed?
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Background: Autistic people with intellectual disabilities (ID) are at increased risk of potentially traumatic experiences, including violence or sexual abuse, but the prevalence of posttraumatic stress disorder (PTSD) in this population is unclear. Furthermore, previous research suggests that symptoms of PTSD may be misinterpreted as anxiety, depression, or “challenging” behaviours in these individuals. Such misinterpretations seem particularly likely if the traumatic experience is not known by, or reported to, mental health professionals. However, even when traumatic experience is reported, it is unclear how such reports inform diagnostic decision-making in mental health services for this population.

Objectives: To explore the clinical and behavioural characteristics, including final diagnoses, of autistic individuals with intellectual disabilities who have experienced violence and sexual abuse, in a clinical sample of autistic adults with intellectual disabilities referred for general mental health assessment.

Methods: Autistic adults/older adolescents with ID (n=89; age M(SD)=27.5(10.76); 29.2% female; 83.1% mild/moderate ID, 16.9% severe/profound ID) were recruited from specialist mental health services for adults with ID. Frequency analyses were conducted for final diagnoses among participants having experienced violence/sexual abuse. Associations with scores on the Psychopathology in Autism Checklist (PAC) and the Aberrant Behavior Checklist (ABC) were investigated for violence and sexual abuse using hierarchical regression (ENTER model), controlling for age, gender, level of intellectual disability, verbal language skills, and autism-related characteristics.

Results: Violence was reported for 30 (33.7%) participants (in males 36.5%, females 26.9%; mild/moderate ID 31.1%, severe/profound ID 46.7%) and included institutional abuse, caregiver/domestic violence and random assaults. Sexual abuse was reported for 15 (16.9%) participants (in males 15.9%, females 19.2%; mild/moderate ID 16.2%, severe/profound ID 20.0%). Sexual abuse had been perpetrated by family members, service providers or peers. For six participants (3 females, 5 mild/moderate ID) co-occurring violence and sexual abuse was reported. Final diagnoses for participants having experienced violence included anxiety disorders (46.7%), affective disorders (33.3%), psychosis (30%), personality disorders (10%), obsessive-compulsive disorders (6.7%), and PTSD (6.7%). For sexual abuse, final diagnoses included anxiety disorders (53.3%), affective disorders (46.7%), personality disorders (26.7%), PTSD (13.3%), and psychosis (6.7%). For behavioural measures, associations were found for these experiences on two of the subscales on the ABC: irritability/agitation/crying and hyperactivity/noncompliance. PAC scores over cutoff were common on the anxiety, depression, and general adjustment difficulties scales for both experiences, as well as on the psychosis scale for violence.

Conclusions: In this sample, despite evidence of high prevalence of traumatic experiences, only three participants were diagnosed with PTSD: one had experienced violence, one had experienced sexual abuse, and one had experienced both. PTSD diagnoses were rare even if clinicians had access to reports of violence and sexual abuse, and these reports were associated with behavioural measures previously found to be associated with PTSD. This indicates that PTSD may be an underutilized diagnosis in services for this population, and that emotional and behavioural changes associated with traumatic experience are unlikely to be reflected in clinical diagnoses in mental health services for this population.

229.003 (Panel Discussion) Subjective Trauma and PTSD Symptomatology across the COVID-19 Pandemic in Autistic and Non-Autistic Adults

Background: Autistic individuals appear to develop post-traumatic stress disorder (PTSD) following a wide range of adverse life events and have higher rates of probable PTSD compared with non-autistic individuals. The COVID-19 pandemic has been universally challenging, particularly for autistic individuals for whom uncertainty and change can be particularly distressing.

Objectives: This study aimed to investigate the impact of the COVID-19 pandemic on autistic and non-autistic adults, by comparing types and rates of trauma exposure and subsequent PTSD symptomatology longitudinally across the pandemic.
Methods: A longitudinal design was used to compare trauma and PTSD symptom levels between autistic (N=148) and non-autistic (N=137) adults across four timepoints of the pandemic. Participants were recruited from Belgium, the Netherlands and the United Kingdom and included a mixed gender sample (N=218 female, N=57 male, N=10 other). Trauma was defined according to participants own subjective interpretations of experiences.

Results: Experience of trauma across the pandemic was not the norm, no trauma was reported by 45-59% of autistic adults and 57-67% of non-autistic adults. Rates of trauma exposure were higher for autistic adults than non-autistic adults at two time points, the middle and end of the restrictions. Both autistic and non-autistic adults reported some traumas which would not meet the DSM-5 A1 definition of trauma, but were subjectively perceived as traumatic, for example difficulties with relationships, employment and daily living. Traumas reported more commonly by autistic adults included, for example, others not following lockdown restrictions, mental and physical health difficulties, and emotional abuse during the pandemic. Multilevel modelling revealed consistently higher PTSD symptom severity for autistic adults compared to non-autistic adults in response to these covid-traumas, but PTSD severity did not fluctuate across the pandemic.

Conclusions: Findings illustrate that a range of life events were interpreted as traumatic by autistic and non-autistic adults across the COVID-19 pandemic. Traumatic events occurring across the pandemic were linked to more severe PTSD symptomatology for autistic than non-autistic adults, necessitating the provision of sufficient support for this population.

Objectives: The present study aimed to explore the role of SC in autism-PTSD co-morbidity. Specifically, we examined the following questions: 1. Do autistic, compared to TD, individuals face an increased risk for PTSD? 2. Is impaired SC associated with increased PTSD symptoms among autistic individuals? 3. Does SC moderate the association between autism and post traumatic symptoms?

Methods: 101 adults, 51 with ASD and 50 TD controls, participated in this study (mean age=23.78, SD=4.95; 55.4% males, 44.6% females). Groups were comparable on age, education, family status and employment status. Inclusion criterion for participation in the autism group was an official diagnosis by a clinical psychologist or psychiatrist, without intellectual impairment. Participants completed self-report questionnaires assessing sociodemographic variables, PTSD (PCL-5), and stressful life events (LEC-5). SC was assessed using the ‘Reading the Mind in the Eyes’ Test (Baron-Cohen et al., 2001), which examines a participant’s ability to identify others’ complex emotional and mental states.

Results: Autistic individuals reported a significantly higher rate (43%) of probable PTSD (based on PCL-5 cutoff) compared to TD controls (22%), as well as higher scores on total PTSD symptoms and all PTSD symptom clusters, except for avoidance. SC was positively associated with PTSD severity in the autism group only (with PTSD total score, r=.328, p<.05; with intrusion, r=.328, p<.05; with hyperarousal, r=.336, p<.05). Finally, SC was found to moderate the association between autism and PTSD symptoms. Thus, autism was associated with PTSD intrusion symptoms when social cognition scores were high (t=-3.11, p<.01; t=-2.28, p<.05 for males and females, respectively), but not when they were low.

Conclusions: Autistic individuals may be particularly vulnerable to the negative effects of traumatic exposure. Previous studies from both our team and others have shown that social stressors (e.g., ostracizing, bullying) may be particularly distressful for autistic individuals. Interestingly, our findings show that a more accurate perception of interpersonal and social cues may be associated with higher levels of PTSD among autistics. This may be attributed to the fact that one’s understanding of social adversity and victimization may increase one’s sense of perceived threat, subsequently leading to elevated levels of post-traumatic distress. Mental health professionals are encouraged to take into account autistic individuals’ perception and interpretation of social aspects, in order to more accurately tailor trauma-focused interventions to meet the unique needs of this population.
Background: Co-occurring mental health conditions are higher in autism than the general population. Rates of these conditions increase during adolescence and into early adulthood. Sex/gender-specific patterns of mental health conditions have been observed, however little is known about how anxiety and depression symptoms may develop across the lifespan in autistic males and females. Social communication difficulties, which form a continuum across the population including those with formal autism diagnoses, have also been associated with mental health issues.

Objectives: To compare rates of depression and anxiety amongst males and females with/without an autism diagnosis or social communication difficulties.

Methods: Participants were obtained from the Avon Longitudinal Study of Parents and Children (ALSPAC), a population-based cohort study following over 14,000 children from birth up to adulthood. Information on autism diagnosis (male N = 119, female N = 28) and social communication difficulties (SC; Social Communication Disorder Checklist) were obtained in childhood. Participants were split into high SC (top decile; male N = 155, female N = 140) and low SC (lowest 9 deciles; male N = 1438, female N = 2176) groups within each sex. Symptoms of depression (Short Moods & Feelings Questionnaire) and anxiety (General Anxiety subscale of the Development and Wellbeing Assessment) were measured at multiple timepoints from age 10 to 16 years (anxiety) or 10 to 28 years (depression). Clinical diagnoses of depression were recorded at 18 and 24 years, and of anxiety at 24 years, with odds of diagnosis calculated within each sex for diagnostic and SC groups. Trajectories of predicted mean scores for anxiety/depression were compared between autistic/high-SC and non-autistic/low-SC participants within each sex, using mixed-effect linear growth models and controlling for relevant covariates.

Results: Trajectories for males and females are presented in the attached figures. Autistic males had higher symptoms of depression and anxiety than non-autistic males in early adolescence, but were no more likely to have a diagnosis of anxiety (Adj OR = 1.67, 95% CI = 0.34 – 8.22) or depression (Adj OR = 0.87, 95% CI = 0.12 – 5.77) in adulthood. In contrast, no differences were observed between autistic and non-autistic females; however females with high SC were more likely to receive a diagnosis of depression (Adj OR = 1.93, 95% CI = 1.21-3.08) or anxiety (Adj OR = 1.84, 95% CI = 1.12 – 3.02) at 24 years compared to females with low SC.

Conclusions: Autism diagnosis and high autistic traits predict higher levels of anxiety and depression for males in adolescence, although there is less evidence into adulthood. In contrast, there is more evidence for females’ anxiety and depression being driven by social communication difficulties specifically across adolescence and early adulthood. Interventions to address mental health issues in autism should consider both sex and age, and that females with social communication difficulties (whether or not they have a diagnosis of autism) should be considered particularly at risk for anxiety and depression. However, results may be biased by missing data, particularly for the small sample of diagnosed autistic females.

Background: Anxiety disorders commonly co-occur with autism and occur more frequently in females in the general population. However, sex-specific prevalence rates of co-occurring anxiety in autism remain understudied. In addition, there is increasing recognition that autistic individuals may have unspecified, or distinct, presentations of anxiety in addition to traditional DSM-specified anxiety disorders. Again, sex differences in the presentation of distinct and DSM-specified anxieties have not yet been examined.

Objectives: 1) To evaluate sex differences in the rates of distinct and DSM-specified anxieties 2) To examine the development of the amygdala and 32 monosynaptically connected regions across childhood in a large, longitudinal cohort of autistic children.

Methods: Autistic participants were enrolled at 2-3.5 years of age (n = 112, 89 assigned male at birth, 23 assigned female at birth) and assessed longitudinally at three additional time points across childhood. MRI scans were acquired at each time point and anatomically-based parcellations were conducted using MRICloud. At Time 4, when children were 9-11 years old, the Anxiety Disorders Interview
Schedule-IV-Parent Interview (ADIS) and Autism Spectrum Addendum (ASA) were administered. The ADIS-ASA is a semi-structured diagnostic interview that differentiates between anxiety and autism symptoms and captures distinct expressions of anxiety in autistic youth. DSM-specified anxieties included specific phobia, separation, social and generalized anxiety disorders. Forms of anxieties distinctly related to autism included idiosyncratic fears, fear relating to social confusion, special interest fears, and fears of change. Clinician severity ratings > 4 were utilized as a diagnostic cutoff for each anxiety disorder. The proportion of males and females endorsing DSM and distinct anxieties was compared using chi-square tests. Descriptive post-hoc sex comparisons for each form of anxiety were conducted. Analyses were repeated excluding children who only endorsed specific phobia.

Results: Autistic children with distinct anxieties exhibited slower amygdala growth resulting in smaller amygdala volumes at T4, but the opposite pattern (larger right amygdala) was observed in children with DSM-specified anxiety. Sex differences in the development of the amygdala network were also observed. At T4, a higher proportion of autistic females had distinct anxiety presentations than autistic males (65% vs 31%, p = .003), driven by a higher proportion of autistic females with fear of change (43% of females, 17% of males). If individuals with specific phobias only were excluded (17 male, 1 female), rates of DSM-anxieties also trended higher in females (55% vs 37%, p = .10). Autistic females had higher rates of social anxiety (17% vs 4%), generalized anxiety (28% vs 17%), and separation anxiety (17% vs 7%).

Conclusions: During middle childhood, autistic females have higher rates of clinical anxiety than autistic males, particularly in presentations that are distinct to autism. Distinct presentations of anxiety are not as easily recognized and may have different risk factors and etiologies than DSM anxieties. If distinct anxieties are more common in autistic girls, this implies the need for more careful assessment of anxiety as well as treatment selections. Future studies will evaluate sex differences in early childhood behavioral and neural predictors of these different forms of anxiety.

318.003 (Oral) Exploring Diagnostic Bias: Sex Differences in Psychiatric Diagnoses Preceding and Following a Diagnosis of Autism, and Their Association with Age of Autism Diagnosis

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Background: While both autistic males and females are at increased risk of psychiatric diagnoses compared to non-autistic young people, autistic females are at particularly elevated risk. Sex differences in the identification and diagnosis of autism might be relevant: autistic traits might more likely be misdiagnosed as psychiatric conditions in autistic females, delaying autism diagnosis. This is reflected in autistic females often receiving psychiatric diagnoses (e.g., anxiety and depression) prior to their autism diagnosis, which sometimes are no longer present after receiving a diagnosis of autism. It is important to clarify whether increased diagnoses of mental health problems in autistic females reflect true co-occurrence or result from diagnostic bias.

Objectives: To investigate sex differences in psychiatric diagnoses received prior to being diagnosed as autistic, their stability over 5 years following autism diagnosis, and to what extent they are associated with age of autism diagnosis.

Methods: Using a population-based cohort design, we identified all individuals born in Sweden between 1990 and 2008 with a clinical autism diagnosis (19,223 males, 7,881 females). Linking different national registers, we identified outpatient and inpatient diagnoses of 12 different psychiatric diagnoses received prior to and following an autism diagnosis from the National Patient Register. We compared prior diagnoses and their stability over time (being re-diagnosed with the psychiatric disorder) between autistic males (reference) and females using logistic regression analyses. We further used generalized estimating equations, to examine the association of a prior psychiatric diagnosis with age of autism diagnosis, and how this differed by sex.

Results: Mean age of autism diagnosis was 11.33 (SD=4.95) for autistic males and 13.06 (SD=5.09) for autistic females (t=25.694, p<.001). Odds ratios (OR), comparing autistic males and females, indicated higher odds among autistic females for all psychiatric disorders (ORrange=1.40[1.05,1.87]-20.38[9.37,44.31], Figure 1) except substance use disorders (OR=1.04[.76,1.41]). Autistic females were further more likely than autistic males to retain their diagnosis in the 5 years after autism diagnosis, indicating their stability over time (Figure 2). This was the case for 11 out of 12 disorders (ORrange=1.48[1.16,1.90]-29.82[9.27,95.95]; ORsubstance-use disorders=.99[.60,1.63]). A psychiatric diagnosis received prior to an autism diagnosis was associated with a later age of autism diagnosis (2.72 years [2.62,2.81]). The interaction with sex was not statistically significant (β=.06[-.10,.21]), indicating that prior diagnoses delay autism diagnosis for both, autistic females and males with psychiatric diagnoses.

Conclusions: Autistic females, who remain underrepresented in research and clinical practice, are more likely to receive psychiatric diagnoses prior to their autism diagnosis and are also more likely to keep their psychiatric diagnosis after being diagnosed as autistic compared to autistic males. This suggests that increased mental health problems in autistic females reflect true comorbidity rather than...
diagnostic bias, highlighting the need to increase early mental health services. Our findings indicate that the presence of prior psychiatric diagnoses might overshadow autistic traits and thus delay autism diagnosis for both autistic females and males, and to a similar extent. Consequently, increased research and clinical efforts in differentiating autism from psychiatric conditions with overlapping symptoms are required to ensure timely diagnosis.

318.004 (Oral) Autism Severity, Cognitive Impairment, and Sex As Predictors of Anxiety and Depression Among Youth with ASD
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Background: Youth with autism spectrum disorder (ASD) are at elevated risk for experiencing depression and anxiety. However, the characteristics of youth with ASD who may be at increased risk for internalizing problems are not well understood. Researchers have postulated that youth with higher cognitive abilities and poorer social communication skills may be particularly at risk, as they may have greater insight into their social difficulties. Additionally, given evidence that typically-developing girls are at increased risk for internalizing problems, particularly depression, girls with ASD may also be at heightened risk relative to boys. However, correlates of internalizing outcomes among ASD and potential moderators of those associations are poorly understood.

Objectives: We investigated whether autism severity interacts with cognitive impairment or sex to predict anxiety and/or depression symptoms among youth with ASD.

Methods: Participants comprised 7996 children ages 6-17 (M=10.77, SD=3.31; 77% boys) with ASD from the Simons Foundation Powering Autism Research for Knowledge (SPARK) registry. Autism severity was assessed via caregiver report on the Social Communication Questionnaire. Symptoms of anxiety and depression were assessed via caregiver report on the Child Behavior Checklist. Presence or absence of cognitive impairment was a derived variable that was calculated based on all available clinical signs of possible intellectual disability (e.g., IQ scores, reported delays, Vineland scores).

Results: Complete results are reported in Table 1. Autism severity (β=.12) and cognitive impairment (β=.05) both predicted anxiety (p<.001). Greater autism severity was associated with higher levels of anxiety, while presence of cognitive impairment was associated with lower levels of anxiety. Autism severity and cognitive impairment did not interact to predict anxiety symptoms (β=.05, p=.41). Autism severity predicted depression, such that greater autism severity was associated with higher levels of depression (β=.17, p<.001). However, presence of cognitive impairment was not associated with symptoms of depression (β=.01, p=.47). Autism severity and cognitive impairment did not interact to predict depression (β=.01, p=.68).

Autism severity interacted with child’s sex to predict anxiety (β=.04, p=.002), such that the association between autism severity and anxiety was stronger for boys than for girls (Figure 1). Autism severity (β=.18) and sex (β=.08) both predicted depression (p<.001); greater autism severity and female sex were associated with higher levels of depression. However, autism severity did not interact with sex to predict depression (β=.02, p=.18).

Conclusions: Youth with greater autism severity experienced more symptoms of anxiety and depression. Importantly, associations between cognitive impairment and internalizing outcomes differed across symptom domains. Cognitive impairment was related to anxiety, but not depression; youth with cognitive impairment had lower levels of anxiety relative to their peers without cognitive impairment. Findings support the hypothesis that youth with ASD without cognitive impairment may be uniquely vulnerable to experiencing anxiety. Alternatively, barriers to the accurate measurement of anxiety in youth with ASD who have cognitive impairment (e.g., expressive language limitations) may contribute to lower caregiver-reported symptom levels. Autism severity interacted with sex to predict anxiety, but not depression; the association between autism severity and anxiety was stronger for boys than for girls.

416 - Medical and Psychiatric Comorbidity II

416.281 (Poster) Gender Identity of Adolescents on the Autism Spectrum with Co-Occurring Psychiatric Disorders
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Background: The prevalence of autism spectrum disorders (ASD) in individuals attending specialized clinics for those experiencing gender dysphoria ranges from 5.5 to 26% (Pasterski et al. 2014; Kaltiala Heino et al. 2015), which is well above the 1% prevalence of ASD.
in the general population (e.g., Baird et al. 2006). Research on the psychological experiences of those who belong to both groups is therefore critical to develop strategies that can improve psychological well-being and reduce risk of adverse mental health outcomes.

Objectives: This is a retrospective study that aimed to compare the experiences of gender between adolescents with and without ASD who presented to an inpatient psychiatric unit in Gdansk, Poland.

Methods: Data on 34 adolescents. 16 with ASD and 18 without ASD, who were admitted to an adolescent psychiatric unit due to life-threatening behaviors from January to October 2022 were analyzed. The methods used to understand their psychological experience included clinical interviewing and observation, mental state examination, and consultation with an expert in sex and gender orientation. Both adolescents with and without ASD reported discomfort with their biological sex. Major themes in psychological functioning were analyzed including a sense of belonging and gender dysphoria, among others.

Results: The 16 adolescents with ASD reported experiencing minority stress, lack of support, feelings of alienation and "otherness", lack of a sense of group belonging and lack of a sense of identity, more often than symptoms fulfilling diagnostic criteria for gender dysphoria. In adolescents without a diagnosis of ASD, no identical statistically significant conclusions were found.

Conclusions: Findings from this study emphasize the necessity of providing timely diagnosis and treatment planning for those with ASD and gender diversity who present to acute care settings. These interventions, which include both treatment of core psychiatric problems and addressing psychosocial support factors, are crucial in reducing suicide risk and rehospitalization, while also helping adolescents navigate the tasks of adolescence, which may be particularly difficult for those with ASD.

REFERENCES:


416.282 (Poster) Examining Gender Differences and Interrater Agreement for Internalising Symptoms in Young Autistic People
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Background: Anxiety and depression are the most common co-occurring conditions among young autistic people. Previous studies examining internalising symptoms in this group, however, have generally used predominantly male samples that have precluded firm conclusions about their prevalence and severity in females. Further, many studies have compared young autistic people with neurotypical community samples, rather than a clinical group who may have a higher prevalence of co-occurring mental health challenges.

Objectives: The first aim was to ascertain whether there were differences in anxiety and depression symptoms in a clinical sample of young people, based on gender and diagnostic status (autistic or non-autistic). The second aim was to determine the inter-rater reliability across young people, parents and teachers.

Methods: Participants were children and adolescents referred to a University clinic in Melbourne, Australia for a clinical assessment. The sample comprised 146 young people aged 6 – 18 years (73 autistic; 92 males and 54 females) matched on gender, age and socioeconomic status, as well as 146 parents and teachers. Parent, teacher and self-report of anxiety and depression symptoms were examined using the Behavior Assessment System for Children - Third edition.

Results: When controlling for age and FSIQ, significantly higher anxiety and depression was reported for young autistic people compared with the non-autistic clinical group based on parent report (scores fell within the ‘at risk’ range), but no gender or interaction effects. No group differences were found based on teacher report. Significantly higher anxiety and depression were self-reported by autistic young people compared with the non-autistic clinical group (although scores fell within the average range), but no gender or interaction effects. Inter-rater reliability was poor to moderate for parent-teacher ratings and very poor for self-teacher ratings across both the autistic and non-
autistic young people. Inter-rater reliability was poor for parent-self ratings with the exception of depression in the autistic group, which was poor to moderate.

Conclusions: The absence of interaction effects in the present study suggests that autistic males and females may be equally susceptible to elevated anxiety and depression, contrary to the double-hit hypothesis proposed for autistic females related to internalising conditions. Only parents, however, reported higher internalising symptoms in autistic young people. Autistic young people rated themselves as having average anxiety and depression, which may relate to the items being insufficiently sensitive to situations that evoke anxious or depressed feelings in these young people or that they have less insight into their symptoms. The poor inter-rater reliability, particularly when teachers and parents were compared with self-ratings, suggests that use of a broad-band behaviour measure may result in young people under-reporting their anxiety and depression symptoms (irrespective of whether they are autistic or have other clinical conditions). Alternative measures developed specifically for autistic people should be considered in clinic settings, particularly when the clinician seeks to understand internalising symptoms from the perspective of the young person.

416.283 (Poster) What Predicts My Personality Profile: Autism, Alexithymia or Both?

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Background:

Autism spectrum disorder (ASD) and personality disorders (PD) are often considered as differential diagnoses. However, in the diagnostic process they are often difficult to distinguish especially in late adolescence and adulthood. A possible reason for this difficulty may be alexithymia (i.e. the inability to identify and describe emotions in oneself and others), which is frequently found in both disorders. Recent research indicates that individuals with ASD can develop certain personality traits in addition to their autism. Comorbid alexithymia could be an influential factor in the complexity of these disorders of social interaction.

Objectives:

In this study, we investigated whether the degree of autistic and alexithymic traits can explain the co-occurrence of specific personality traits (namely schizoid, Borderline, narcissistic, avoidant and obsessive-compulsive PD). Autistic and alexithymic traits are dimensional constructs and present in both clinical and non-clinical populations. Thus, we extended the investigation beyond ASD and included other patients with social interaction difficulties other than autism as well as the general population.

Methods:

We included 89 individuals with confirmed ASD diagnosis (ASD group; 62 males; mean age: 34.8 ± 10.6 years), 51 individuals with a psychiatric diagnosis other than autism (Non-ASD group; 30 males; mean age: 34.8 ± 12.4 years) and 84 individuals without any psychiatric diagnosis considered as neurotypicals (NT group; 32 males; mean age: 25.8 ± 6.3 years). Autistic traits were measured by the Autism Quotient (AQ) test. Levels of alexithymia were assessed by the Toronto Alexithymia Scale with 20 items (TAS-20) and personality traits were obtained by the Assessment of DSM-IV Personality Disorders (ADP-IV). Data processing and statistical analyses were performed in MATLAB (R2010a, The MathWorks, Inc., Natick, MA, USA) and IBM SPSS 27.0 including the bootstrapping tool (IBM Corp., 2020). For each model and diagnostic group, we performed a three-step, forced entry hierarchical regression analysis with changed entry orders of the independent variables (AQ and TAS-20 scores). The five personality PDs served as dependent variables. It was controlled for age, sex, depressive and social anxious symptoms.

Results:

Alexithymia (TAS-20 scores ≥ 61) was found in 58.4 % of the ASD group, 49.0 % of the Non-ASD group and 6.0 % of the NT group. Schizoid traits were predicted by AQ scores in the ASD sample (b=0.22, p=.018), and by TAS-20 scores in the NT sample (b=0.17, p=.027). Borderline traits were predicted by TAS-20 scores only in the NT group (b=0.25, p=.022). No significant models could be established for narcissistic or avoidant PD in any diagnostic sample. Obsessive-compulsive traits were predicted by AQ scores in all three diagnostic groups (ASD: b=0.30, p=.016); Non-ASD: (b=0.27, p=.046); NT: (b=0.44, p=.018)

Conclusions:

In contrast to the high comorbidity rate, alexithymia did not represent a risk factor for any of the five selected PDs neither in the ASD nor in the Non-ASD group. However, autistic traits were identified as predictors of obsessive-compulsive traits in all three diagnostic groups.
416.284 (Poster) Impact of Covid-19 Crisis on the Behavioural and Emotional Adjustment of Children with ASD and Their Families: A National Study

Background:
Children with autism spectrum disorders (ASD) experienced a variety of behavioural challenges during the COVID-19 pandemic and its associated lockdown. It is not known whether the nature or severity of those challenges differed from those experienced by children with intellectual disabilities ID that are not associated with ASD. To address this question, we surveyed participants in the IMAGINE-ID national UK study of children with Intellectual Disabilities (IDs) of known genetic origin.

Objectives:
We aimed to identify the range and severity of behavioural and emotional reactions to lockdown in children with ASD during the period when the Covid-19 pandemic impacted children’s ability to access in-person educational provisions for several months. We compared reported difficulties to those experienced by children whose ID was not associated with ASD. We tested the hypothesis that parents of children with ASD would report more severe emotional and behavioural responses to lockdown than those with children whose ID was not associated with ASD traits.

Methods:
1063 caregivers completed the Coronavirus Health and Impact Survey (CRISIS) between May-December 2021. The CRISIS questionnaire enquired about the following areas of concern: overall parental stress; whether their child shielded; the biggest challenges faced by the family; changes in the child’s emotional adjustment and behaviour during this critical period of the pandemic. Positive changes were defined as children becoming happier, more relaxed, and more confident, whilst negative changes were defined as becoming more irritable, less energetic, and more restless.

Results:
Data were obtained on 1063 participants (7 to 27 years, M=14.9, SD=4.4), of whom 55% were male. Overall, 40.5% had ASD; the remainder had ID of genetic aetiology that was not associated with ASD traits. Caregivers of children with ASD reported a greater level of CRISIS-measured familial stress compared to families whose child did not have ASD traits (p<0.001). Overall, most families (84.5%) reported facing challenges to their children’s mental health due to the pandemic and its associated temporary shielding requirement. Overall, IMAGINE-ID children had increased anxiety (21.5%), loneliness (13.7%) and low mood (6.7%), but there were significant differences in both the nature and the severity of Covid-related problems between subgroups. The biggest challenge for those with ASD was anxiety (29% vs 16%) but the restrictions imposed by social distancing were less impactful on them (21% vs 26%). Overall, negative behavioural reactions to lockdown (42%) were greater than positive reactions (16%).

Conclusions:
During the peak of the Covid-19 pandemic, children with ASD had more severe and wide-ranging emotional and behavioural reactions to lockdown, and lack of access in-person education, than children with ID that was not associated with ASD.

416.285 (Poster) Increased Multimorbidity across Organ Systems Among Autistic Versus Non-Autistic People
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Background: There is growing evidence of poorer physical health and associated outcomes of morbidity and mortality in autistic people. Whilst studies have examined the prevalence of health conditions in autistic people, there are so far no studies examining physical multimorbidity in autistic adults without intellectual disability. In this context, multimorbidity refers to chronic health conditions affecting multiple organ systems (at least two) and does not include autism.

Objectives: to compare rates of multimorbidity between autistic and non-autistic people.

Methods: We administered an anonymous, cross-sectional, self-report survey using a convenience sampling design to autistic (n = 1129) and non-autistic (n = 1176) adults (mean age 41.3, 65.9% female, 86% White, 66.9% UK Based). This anonymous online survey inquired...
about demographics, lifestyle behaviours, personal medical history, and family medical history. A variable was then created totalling the possible organ systems implicated (with each chronic condition only counting towards one organ system) across the following categories: respiratory, cardiovascular, gastrointestinal, endocrine, neurological, bone and joint, visual, ear/nose/throat, liver and kidneys, haematological, skin, and diabetic/prediabetic conditions. We utilised R version 4.2.1, package CrossTable for chi-squared tests and glm to conduct unadjusted and adjusted regression analyses covarying for age, sex, ethnicity, country of residence, education level and lifestyle behaviours (i.e. smoking, alcohol, BMI) to assess differences in rates of multimorbidity among autistic and non-autistic individuals. We used the Benjamini-Hochberg procedure for multiple comparison correction.

**Results:** The distributions of the data are presented in figure 1. A Kolmogorov-Smirnov test demonstrated that the data were non-normally distributed ($p<0.0001$). A two sample Anderson-Darling Test demonstrated that the distributions of the autistic/non-autistic samples were significantly different ($p<0.001$). We compared the levels of multimorbidity between autistic and non-autistic samples, which showed a significant difference (67.4% versus 53.4% respectively, $p<0.0001$).

An initial unadjusted Poisson regression demonstrated significance at the $p<0.0001$ level (relative risk (RR) 1.43, 95% CI 1.40-1.47). When factoring in basic demographic factors (age, sex, ethnicity, country of residence, education level), the relative risk increased to 1.54 (95% CI 1.45-1.64, $p<2.2e-16$). When accounting for lifestyle factors, the relative risk was 1.51 (95% CI 1.41-1.61, $p<2.2e-16$). There was a non-significant interaction of sex and autism in this model.

We then re-examined these models with an age x autism interaction term. This was significant in the unadjusted model ($p<0.0001$). However, in the demographic and the lifestyle adjusted models, the variable became non-significant ($p=0.26$ and $p=0.27$ respectively).

**Conclusions:** Our data provide preliminary evidence that autistic people are likely to have illnesses affecting 1.5 times more organ systems than others, even after accounting for age, sex, ethnicity, country of residence, and lifestyle behaviours. However, these analyses should be confirmed using population-based data, given our sample’s bias towards white, female, university educated UK adults. To our knowledge, this is the largest analysis of multimorbidity among autistic adults to date.

**416.286 (Poster) Intolerance of Uncertainty Is Associated with Irritability in School-Age Autistic Children**

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Background: Intolerance of Uncertainty (IoU), a dispositional tendency towards thinking and responding to uncertain situations in daily life in a negative or maladaptive way, is associated with anxiety in autism (Jenkinson et al., 2020). In addition, IoU is considered one of the key processes in autistic cognition (Stark et al., 2021) that contributes to anxiety and other co-occurring internalizing and externalizing behavioral problems in autism (Ozsivadjian et al., 2021). Irritability, which encompasses a variety of behavioral problems including anger outbursts, is a common and impairing set of externalizing behaviors in ASD. Although IoU and anxiety in autism has been well documented, no studies to date have examined the potential contribution of IoU to irritability in autism.

**Objectives:** To examine the associations between intolerance of uncertainty and irritability in children with ASD with co-occurring anxiety disorders.

**Methods:** Subjects included 75 children with ASD and 26 age- and sex-matched typically developing (TD) controls, aged 8-15 (M=11.8, SD=1.80; 28.7% female). ASD diagnosis was confirmed with the ADOS-2 and ADI-R, conducted by a research reliable clinical psychologist; a clinical interview; and a review by an expert clinician. Parents completed the 27-item Intolerance of Uncertainty Scale for children (IUS) (Comer et al., 2009), the Multidimensional Anxiety Scale Second Edition (MASC-2) (March, 2013), and the Affective Reactivity Index (ARI) (Stringaris et al., 2012). Analyses were conducted in SPSS. Independent sample t-tests were used to assess group differences between ASD and TD samples, and bivariate correlations and hierarchical linear regressions were used to test associations of IoU with anxiety and irritability.

**Results:** First, autistic children had significantly higher scores on IoU, anxiety, and irritability measures relative to TD controls. Second, within the autism group, IoU was found to be significantly correlated with both anxiety ($r_{75}=0.24$, $p=0.038$) and irritability ($r_{75}=0.36$, $p=0.002$). Lastly, hierarchical regression analyses revealed that after accounting for age, IQ, and anxiety entered as the first block, there was a significant effect of IoU on irritability (Model $R=0.422$, $R^2$ change=0.087, $F_{1,67}$change=6.659, $p=0.012$) (Figure 1).

**Conclusions:** These findings demonstrate that, even after statistically controlling for the presence of anxiety, Intolerance of Uncertainty was associated with irritability in autistic children. IoU may reflect a cognitive process that contributes to negative affectivity in general, thus impacting both anxiety and irritability. Given that irritability is a common and impairing problem that affects approximately 40% of autistic children, IoU could be tested as a possible moderator of behavioral and cognitive-behavioral interventions for irritability in autism or as a potential target for intervention for irritability in autism.
Background: Social anxiety is highly prevalent in the autistic community (White et al., 2014), but it is currently unclear to what extent this overlaps with social desire. In the general population, individuals with social anxiety disorder tend to be socially motivated (Lee & Jang, 2019). Within the autism spectrum, individual variability in social motivation has been documented in general, with empirical findings suggesting a developmental trend toward increased social motivation with age among autistic people (Deckers et al., 2017). Despite the lack of research on this topic, many hypothesize that autistic individuals who experience social anxiety tend to be socially motivated (White & Roberson-Nay, 2009).

Objectives: Using data from an ongoing study of emotional health in autistic adults, we aimed to investigate the overlap between self-reported social anxiety and social motivation. We hypothesized that greater social anxiety would be associated with higher levels of social motivation in both autistic and non-autistic cohorts.

Methods: We compared adult samples of N=77 autistic adults (Age M=26.43, SD=6.948; n=29 men, n=39 women, n=9 nonbinary/other) and N=41 non-autistic, non-depressed adults (Age M=26.37, SD=7.599; n=16 men, n=24 women, n=1 nonbinary/other). The Brief Fear of Negative Evaluation (BFNE; Leary, 1983) was used to operationalize social anxiety, and the Anticipatory and Consummatory Interpersonal Pleasure Scale (ACIPS; Gooding & Pfum, 2014), indexed capacity for social pleasure/social motivation. We assessed this relationship using a regression model controlling for chronological age and gender.

Results: Social motivation and social anxiety were not correlated among either autistic participants (β=.015, t(130), p=.897) or non-autistic, non-depressed comparisons (β=.117, t(.721), p=.476), in models controlling for age and gender. Visualizing our data by gender groups showed -- in the context of minimal correlation in any gender grouping -- that non-autistic participants followed the expected positive trend (see Figure 1), while autistic women in particular displayed a nonsignificant negative relationship between social motivation and social anxiety (see Figure 2), relative to autistic men and nonbinary individuals who showed almost zero, though positive, association between these variables.

Conclusions: Our findings did not support our hypothesis that greater social anxiety would be associated with greater levels of social motivation across neurotypes. In fact, negligible correlation between social motivation and social anxiety was observed in our sample. Null findings could represent measurement effects, in which social anxiety may cause individuals to be less likely to endorse “wanting” the type of social interactions described on the ACIPS measure, regardless of their true degree of inherent social motivation. A unique, though nonsignificant, negative relation between these variables in autistic women compared to other genders suggests that this research question should be studied in larger samples with robust numbers across gender groupings.

416.288 (Poster) Latent Brain States during Sleep in Rett Syndrome Deviate from the Traditional Sleep Stages

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Background:

Traditionally, quantitatively describing sleep relies on manual scoring of the sleep polysomnography (PSG) into 5 stages: Wake, rapid eye movement (REM), and Non-REM 1-3. However, sleep brain state dynamics may be so significantly altered in developmental brain disorders such as Rett syndrome, that the conventional PSG approach be incomplete, or even inaccurate.

Objectives:

Here we used a Hidden Markov Model (HMM) approach to describe brain activity during sleep as continuous transitions between quasi-stable brain states. We compared the latent states’ structure with traditional PSG scoring, as well as between healthy subjects and the states from Rett syndrome patients, in order to objectively describe the changes in brain state dynamics.

Methods:

Two age groups of healthy children of both sexes (34 subjects, 5.5±2.1 years old and 17 subjects age 14.0±3.2 years) and girls diagnosed with Rett syndrome (age 11.6±5.4 years) participated in the study. As the model input (feature set), we extracted power spectrum from eight frequency bands spanning 0.5 to 20 Hz, as well as the root mean squared (RMS), and entropy of electroencephalogram (EEG),
recorded using a 10-20 EEG system, as well as chin electromyography (EMG) and electrooculogram (EOG). We then fitted multivariate Gaussian HMM to infer the latent brain states, including initial states probability, the mean activity and covariance matrix, and states transition probabilities. In parallel, the sleep data was staged by a sleep technician.

Results:

The HMM states could be well-fitted to the two neurotypical and Rett-syndrome groups. The number of the inferred states that well-explained the variance of the inputted feature set varies across the 3 groups, indicating differing dimensionality to the brain state space in Rett Syndrome. In each group, some states were highly specific to a PSG stage, whereas some states appeared to reflect within-stage microstructure and others reflected novel cross-stage states not captured by conventional PSG staging. More specifically, for the Rett group, no states were highly specific (< 40%) to the REM stage, indicating highly nonstandard REM-related architecture. States exhibiting high sigma power, which reflects spindles, were found in both two control groups, as expected, but were not found in the Rett group. A modularity analysis of the state transition matrix also revealed a high transition probability between states that occurred during NREM3 and REM stages in Rett girls; yet rarely happened in either control group.

Conclusions:

Latent brain states dynamics, as revealed by our HMM framework, perform better in revealing brain state pathology in Rett syndrome, compared with traditional sleep scoring. Our approach holds promise for diagnosis as well as evaluation of treatment efficacy, particularly when treatments aim to alter early developmental neuromodulatory brain state aberrancies in developmental brain disorders.

416.289 (Poster) Longitudinal Evaluation of Gastrointestinal Symptoms in Children with Autism


Background: 1 in 44 children in the US meet criteria for autism. Frequently, co-existing medical issues, such as gastrointestinal (GI) symptoms, can further affect their behavior, daily functioning, and wellbeing. Children with autism have been found to experience more GI symptoms compared to typically developing children. However, it is not well known how these symptoms persist over childhood.

Objectives: To determine the frequency and persistence of GI symptoms across childhood in children with autism in a longitudinal sample.

Methods: 383 children with autism spectrum disorder (ASD) and 166 age-matched typically developing (TD) children were enrolled at 2-3.5 years of age and assessed for GI symptoms at 3 time points: baseline, two years later (4-6 years), and during middle childhood (9-12 years). Diagnostic confirmation of ASD was conducted at each time point using the Autism Diagnostic Observation Scale administered by a licensed clinical psychologist. GI symptoms, including abdominal pain, bloating, constipation, diarrhea, and sensitivity to foods, were assessed using a parent-report obtained via interview by a physician. Frequency of symptoms was rated on a 5-point scale. Children with at least one symptom in the ‘frequently’ or ‘always’ range were categorized as having GI symptoms. The number of concurrent GI symptoms experienced was also assessed.

Results: GI symptoms were reported in 47% of children with ASD compared to 30% in the TD group at baseline (chi square p < .001). Across the three time points, 40% of children with ASD experienced GI symptoms at two time points compared to 15% of TD participants. Children with ASD continued to report more GI symptoms and they were more likely to experience several symptoms at each time point. Moreover, 30% of children with ASD experienced GI symptoms at all three time points, compared to 7% of the TD group. The relative risk (RR) of GI symptoms in ASD relative to TD children is 2.04 [1.62, 2.57] (p < .001), and on average, children with ASD reported 2.4 [1.9, 3.1] more GI symptoms than TD (p < .001). Across both groups, the estimated risk of GI symptoms trended towards higher in females than males (RR = 1.15 [0.98, 1.36]) (p = .07) and females averaged 1.4 [1.1, 1.7] more GI symptoms than boys (p < .01).

Conclusions: Children with autism presented with more frequent and more significant GI symptoms which tended to persist over time. The presence of multiple GI symptoms was found to be associated with diagnosis of ASD and female sex. Future analyses will assess the impact of GI symptoms on behavioral and mental health issues.
Background: Though anxiety is a common psychiatric comorbidity in autism spectrum disorder (ASD), the developmental emergence and trajectory of anxiety in ASD remains poorly understood, particularly early in childhood and in children with intellectual disability (ID). Furthermore, despite the mechanistic role of physiological regulation in anxiety, associations between physiological indices and anxiety symptoms across early development have not been studied in ASD. A better understanding of the relationship between anxiety and physiological regulation across early development in ASD can inform early interventions, which are known to mitigate long-term impacts of anxiety in neurotypical (NT) children.

Objectives: This study aimed to characterize development trajectories of anxiety symptoms and physiological regulation and investigates the relationship between anxiety and physiological regulation across early childhood in ASD.

Methods: Participants included 86 children (ASD: n=49; TD n=37) tested multiple times from 3-7 years of age (256 observations). The mean age of first timepoint was 3.64(0.73) years and was similar between groups (ASD: 3.63(0.55); NT: 3.65(0.94)). Of the children in with ASD, 75.5% had IQs <70. Parent-reported anxiety symptoms were measured by the Anxiety Depression and Mood Scale (ADAMS) total score. Directly observed anxiety symptoms were measured by the Modified Anxiety Dimensional Observation Schedule (M-Anx-DOS) total score. Physiological regulation was measured by heart activity (respiratory sinus arrhythmia [RSA] and heart rate [HR; beats per minute]) during a baseline period. To analyze developmental change, multi-level models were employed, with age, group, and age-by-group interaction entered as predictors. Concurrent correlations between anxiety and physiological regulation were measured via Pearson correlations.

Results: For parent-reported anxiety symptoms, there was a main effect of group, $F(1, 84.7)=63.99, p<.0001$, with ASD exhibiting more symptoms across age, but no effect of age and no age-by-group interaction, $p=.281$. For observed anxiety symptoms, there were main effects of age, $F(1, 196)=7.22$, and group, $F(1, 85.9)=17.41$, and an age-by-group interaction $F(1, 196)=13.13, p<.008$, such that M-Anx-DOS scores increased slightly across age in ASD, while decreasing dramatically in NT controls (Figure 1). For both RSA and HR, there were main effects of age, $p<.001$, and group, $p<.003$, with ASD exhibiting lower RSA and faster HR across early childhood, but no age-by-group interaction, $p>.458$. HR was correlated with observed anxiety symptoms in the NT group, $r=.25, p=.025$ and parent-reported anxiety symptoms in the ASD group, $r=.26, p=.014$ (Figure 2).

Conclusions: To our knowledge, this is the first study to longitudinally examine anxiety as measured by direct observation alongside physiological indices in autistic children with ID. Findings suggest that anxiety symptoms emerge early and remain elevated across early childhood in ASD, while decreasing in NT controls. Physiological regulation was also consistently atypical in ASD (lower RSA, higher HR), but changed across development at a rate similar to NT controls. Heart rate, an indicator of arousal controlled by sympathetic and parasympathetic function, was correlated with anxiety symptoms in both groups, whereas RSA, an indicator of parasympathetic regulation, was not. These findings suggest that hyperarousal, as opposed to physiological regulation, contributes to anxiety in both ASD and NT development.

416.291 (Poster) Vulnerability to Stress in Youth with ASD: Associations with Mental Health and Emotion Regulation


Background:

Previous research shows that individuals with autism spectrum disorder (ASD) experience increased levels of stress, including peer victimization. Repeated exposure to stress could lead to heightened emotional reactivity to minor stressors, which is known to be a vulnerability factor for the development of mental health issues, and which was recently reported in adults with ASD. A mechanism that may contribute to increased stress reactivity and mental health symptoms is a dysregulation of the hypothalamic-pituitary-adrenal (HPA)-axis. Indeed, previous studies have observed altered cortisol levels in individuals with ASD, indicating alterations in the HPA-axis functioning that could partially explain the vulnerability to mental health issues in ASD. Moreover, emotion regulation (ER) difficulties have been reported in individuals with ASD, which could contribute to increased stress responses. However, to date, the effect of stress reactivity or cortisol dysregulation on mental health has been little investigated in ASD, especially during adolescence and emerging adulthood.

Objectives:

The aim was to investigate possible alterations in stress reactivity and daily cortisol rhythm in a sample of verbally fluent adolescents and young adults with ASD, and to examine whether they are associated with mental health symptoms. The role of ER in the vulnerability to stress was also investigated.
Methods:

Adolescents and young adults aged between 12 and 30 years with ASD as well as with typical development (TD) participated in two studies. In the first study, Ecological Momentary Assessment (EMA) was used to investigate perceived stress and negative affects (NA) in daily life in 39 verbally fluent participants with ASD and 55 TD participants. Affective reactivity to daily stress was measured as an increase in NA in response to stressors. In the second study, 46 participants with ASD and 54 TD participants collected salivary cortisol at home several times per day for two days. For the second study, data collection is currently being finalized, and data analyses will be conducted after co-registration of the study. In both studies, psychopathology and ER strategies were assessed with questionnaires and clinical interviews. Multilevel regression models were used to analyze the data.

Results:

Results show higher levels of perceived stress as well as an increased affective reactivity to stress related to daily activities in youth with ASD compared to TD. Moreover, we observed that a more frequent use of maladaptive ER strategies (e.g., rumination) in youth with ASD increased their affective response to stress, and was associated with more severe mental health difficulties. In light of the findings of the first study, we hypothesize that youth with ASD show alterations in daily cortisol that are associated with mental health symptoms. We expect alterations in cortisol to be stronger in individuals who have previously been exposed to higher levels of stress, including bullying.

Conclusions:

The current findings provide insight into the mechanisms that link stress exposure to mental health problems in autism. They highlight the importance of effective stress management and reduction of maladaptive ER to prevent the negative effects of stress in youth with ASD.

416.292  (Poster) Understanding Relationships between Restricted Repetitive Behaviours and Depression, Anxiety and Stress in Autistic Adults without Intellectual Disability

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Background: Restricted repetitive behaviours (RRBs) are key diagnostic criteria in autism involving stereotyped or repetitive movements, insistence on sameness including adherence to routines, and restricted and overly-intense interests. RRBs in autistic people are associated with developing depressive (Simonoff et al., 2008; Ghaziuddin et al., 2002) and anxiety conditions (Jenkinson et al., 2020; van Steensel et al., 2011). However, there is scarce literature focusing on RRBs and mental health in autistic adults, particularly about the subtype of special interests.

Objectives: The present study aimed to explore differences in the three RRB subtypes of special interests, repetitive sensory-motor behaviours (RSMBs) and insistence on sameness (IS), and the three mental health subtypes of depression, anxiety and stress in autistic compared to non-autistic adults, as well as the relationship between RRBs and mental health between the groups. It was expected the autistic group would have higher RRBs and mental health scores than the non-autistic group, and that there would be a stronger relationship between RRBs and mental health measures for the autistic versus the non-autistic group.

Methods: The study was co-designed with autistic and non-autistic individuals from different countries. A total of 120 autistic adults (Mage=33.58, SDage=11.67; 56M/56F/8Other) and 126 non-autistic adults (Mage=32.99, SDage=11.16; 56M/64F/6Other) were recruited, and all participants completed the Adult Behaviour Questionnaire-2 (RBQ-2A; subscales RSMBs and IS), and the University of Bath Interests Scale (UBIS; subscales degree of interest, time engaging in interests, interference and distress), and the Depression Anxiety and Stress Scale (DASS21) to measure mental health. ANOVAs were used for group comparisons and hierarchical regressions were used to explore relationships between RRBs and depression, anxiety and stress.

Results: ANOVA results showed higher depression, anxiety and stress scores as well as greater repetitive sensory-motor behaviours and IS in the autistic versus the non-autistic adults. Autistic adults also showed reduced interests and higher distress and interference in everyday life when unable to engage in their interests, than the non-autistic adults (Figure 1). Regression results showed a stronger negative relationship for the autistic group between time engaging in interests and both depression and anxiety scores, and a stronger positive relationship between the degree of interests and both depression and anxiety scores, compared to the non-autistic group. There was a stronger positive relationship for the autistic group between RSMBs and anxiety compared to the non-autistic group (Figure 2).

Conclusions: The greater scores in RRBs, depression, anxiety and stress scores in autistic versus non-autistic adults are consistent with previous research showing an association between autism and poorer mental health, and with diagnostic criteria demonstrating repetitive behaviours and reduced interests. A higher degree of interest in autistic participants related to poorer mental health, which may reflect the effects of overly-intense interests. Reduced time spent on interests was associated with poorer mental health in autistic adults than non-autistic adults, perhaps reflecting the importance of time engaging in specialised interests for autistic wellbeing. These findings help to
inform interventions and future research exploring the effects of RRBs, specifically of interests on mental health in autism.

416.293 *(Poster)* Using Neurophysiological Sleep Signatures to Evaluate Developmental Trajectories in Toddlers at Risk for ASD

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**Background:** Sleep electroencephalogram (EEG) is a highly advantageous modality for exploring early abnormalities in neurodevelopmental trajectories due to lack of signal noise from external waking stimuli. Certain features of sleep EEG have been found to be atypical in autism spectrum disorders (ASD), including sleep spindle properties and EEG coherence, a measure of functional connectivity. However, few studies have investigated longitudinal changes of these markers in early development when neural circuits are undergoing rapid maturation.

**Objectives:** To evaluate between-group and within-person differences in a) EEG coherence and b) sleep spindle properties in typically developing (TD) toddlers and toddlers with language delay (LD) at risk for ASD at 12-18 months and 36 months.

**Methods:** Participants consisted of 39 TD toddlers and 16 LD toddlers seen at the NIH Clinical Center in Bethesda, MD. Participants entered the study at 12 or 18 months of age, with follow-up at 36 months. At baseline and follow-up, participants underwent an overnight sleep study and a neurodevelopmental assessment consisting of the Mullen Scales of Early Learning (MSEL) and the Vineland Adaptive Behavior Scales. Participants with receptive and language scores in the very low range (T scores ≤ 30 on the MSEL) were placed in the LD group. EEG recordings were collected during awake, drowsy, and sleep states using the 10-20 system of electrode placement.

Spindle data were analyzed using Luna software to determine differences in density, amplitude, duration, frequency, and chirp. Coherence values were analyzed masked to participant group using Neuroguide. Values were subsequently subjected to Fisher transformation and the effects of group and age were evaluated using linear mixed model. Exploratory analyses were conducted separately for coherence and spindles to evaluate associations with verbal developmental quotient (VDQ), non-verbal developmental quotient (NVDQ) and socialization.

**Results:** Increased coherence was observed for LD relative to TD, with differences most prominent in slow-wave sleep (SWS) and few differences detected in the awake state (p<.01). Within the LD group, lower VDQ scores were associated with higher coherence in REM, mainly within 18-25 Hz (Alpha); within the TD group, lower VDQ scores were associated with higher coherence in SWS across multiple frequency bands (p<.01).

Density of 9 Hz spindles decreased at follow-up in central and temporal channels; density of 11 Hz spindles increased in frontal channels (p<.01). Duration and frequency increased for 11 Hz spindles and decreased for 15 Hz spindles. For all parameters, the LD group demonstrated a smaller magnitude of change from baseline to follow-up compared to the TD group.

**Conclusions:** Early detection and diagnosis of autism spectrum disorders (ASD) is crucial to optimal developmental outcomes. Our results indicate that abnormalities in sleep electrophysiological features can be detected as early as 18 - 36 months in children with language delay who are at-risk for ASD, before most other overt symptoms are evident. Additionally, alpha oscillations and sleep spindles are both generated by thalamocortical interactions, an area which has also been implicated in sleep disruptions in ASD. As such, these results provide additional insight underlying the developmental pathophysiology of ASD.

416.294 *(Poster)* Perinatal Risk Factors for Gastrointestinal Symptoms in 2 to 5-Year-Old Children with Autism Spectrum Disorder, Developmental Delay, and from the General Population

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**Background:** Gastrointestinal symptoms (GIS) are common in children with autism spectrum disorder (ASD) and developmental delays (DD). The gut microbiome has been implicated in gastrointestinal dysfunction and in ASD. Elevated maternal pre-pregnancy BMI (PP-BMI), prematurity birth, and cesarean delivery interfere with typical gut colonization.

**Objectives:** Evaluate associations between GIS at 2 to 5-years and perinatal risk factors in children with ASD, DD, and children in the general population (POP).

**Methods:** The Study to Explore Early Development (SEED) is a multi-site, community based, case-control study of ASD risk factors and health problems. The study includes 2,243 2 to 5-year-old children in 3 groups: 840 with ASD and DD with ASD features (DDw/ASD), 602 with DD without ASD features (DDw/oASD), and 801 POP children randomly recruited through birth certificates. Mode of delivery
(MOD), gestational age, PP-BMI, breastfeeding, and maternal race and education were collected from caregiver interview and/or abstracted from prenatal, delivery, and neonatal medical records. Child cognitive score and research diagnostic classification were determined using the Mullen Scales of Early Learning, Autism Diagnostic Observation Schedule, and Autism Diagnostic Interview, Revised. Children with a history of ASD, screen positive for ASD with the Social Communication Questionnaire, or behaviors concerning for ASD during cognitive testing that did not meet strict research criteria for ASD were categorized as DDw/ASD. Within each group, univariate logistic regression models were developed to evaluate associations between having GI problems and the characteristics of interest: MOD, gestational age, PP-BMI, and breastfeeding. Analyses also adjusted for: site; maternal race and education; and child age, sex, and cognitive score. All variables that were significant ≥0.15 in the univariate analysis were dropped. From there the least significant variable ≥0.15 was removed and the multivariate analysis redone until all variables were significant at the <0.15 level.

Results: Associations with GIS at 2 to 5 years in children with ASD and DDw/ASD: male sex aOR 0.64(0.44-0.93) p=0.020, child age 0.97(0.95-0.99) p=0.006, gestational age 0.98(0.95-0.99) p<0.001, black race 0.53(0.41-0.71) p<0.001, other race 0.47(0.30-0.75) p=0.001. Associations with GIS in DDw/oASD: breast feeding <26 months aOR 1.63(1.30-2.04) p<0.001. Associations with GIS in POP: gestational age aOR 0.93(0.88-0.99) p=0.028, black race 0.56(0.36-0.89) p=0.015, and breastfeeding <26 weeks aOR 1.48(1.28-1.73) p<0.0001.

Conclusions: In this cross-sectional study of preschool children using retrospective perinatal history, MOD and PP-BMI were not associated with GIS in any group. Children breastfed <26 weeks were more likely to have GIS in the DDw/oASD and POP groups. Breast feeding was not associated with GIS in ASD and DDw/ASD group. POP children with older gestational age and black race were less likely to have GIS. Children with ASD and DDw/ASD were less likely to have GIS if they were male, older at study enrollment, older gestational age, and not Caucasian. Limitations include: no clinical diagnosis of GIS, no evaluation of microbiome, cross sectional data, lack of information about exclusivity of breastfeeding. Further study is needed to evaluate potential causes for the difference in association with breastfeeding in the ASD and DDw/ASD group compared to DDw/oASD and POP.

416.295 (Poster) Pilot Study Shows Blue Food Coloring in Muffins Provides a Non-Invasive, Objective Measure of Gastrointestinal Function in People across the Autism Spectrum


Background:

Autism-linked gastrointestinal (GI) distress, involving severe constipation, reflux, bloating, and pain are common and yet objective GI assessments for people across the autism spectrum are currently lacking. Moreover, because people with profound autism may be non-verbal or otherwise unable to communicate their symptoms, gastrointestinal symptoms remain under-reported with negative impacts on quality of life for these individuals and their caregivers.

Objectives:

Our goal was to run a small pilot study of a non-invasive, home-based objective measure of whole gut transit time and lag phase, two measures relevant to gut motility/function. To quantify whole-gut-transit-time and other, co-occurring symptoms prospectively, we developed a web application, ‘Stripes Symptom Tracker’ based on a caregiver-assisted questionnaire (Margolis et al. 2019). Stripes Symptom Tracker works on an account system, allowing multiple caregivers to log symptoms.

Methods:

Participants were recruited through the Phelan-McDermid Syndrome Foundation patient advocacy group. There were eleven participants: seven patients and four sibling controls across seven households. Blue muffins were prepared by a professional baker and shipped to consented families. Telemedicine appointments were arranged for each household at the start of their day so that participants would consume the blue muffins after an overnight fast with a doctor present on the call in case of complications. Caregivers were then asked to track four broad categories of symptoms: bowel movements (checking for blue or blue green color in stools), reflux, pain, and neurological symptoms including sleep quality and irritability/aggression for a month using Stripes Symptom Tracker.

Results:

All participants, ranging in age from 8-33 years, ate the blue muffins. Caregivers were able to detect blue dye in subsequent bowel movements in ten of eleven cases, even when whole gut transit (time to first blue bowel movement) and lag phase (time from first to last blue bowel movement) were prolonged, taking 3+ days for transit and six days for lag phase. For one household account creation in Stripes Symptom Tracker was problematic and therefore, detailed prospective symptom data are lacking for one patient and one sibling control. Of the remaining nine participants, four tracked symptoms for a week+, three tracked symptoms for one month, and two tracked symptoms for
Prevalence and Odds of Diabetes Mellitus Among Autistic Adults in the United States

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Background: Diabetes mellitus is a challenging chronic health condition at the forefront of attention of the healthcare system in the United States. Diabetes results in high healthcare costs and is burdensome for patients and families. While important estimates quantifying how diabetes prevalence varies by age exist for the general population, these estimates are poorly characterized among autistic adults. Most estimates for autistic adults have stemmed from relatively small-scale studies or used pediatric samples. Thus, there is a critical gap in understanding the prevalence of diabetes among autistic adults, emphasizing the need for large, adult-focused analyses with greater generalizability to inform the development of autism-specialized diabetes support services.

Objectives: To compare the prevalence of diabetes among autistic adults in the United States to non-autistic adults as a function of age.

Methods: We did a cross-sectional analysis of inpatient and outpatient IBM MarketScan health claims data from 2019-2020 to estimate diabetes prevalence among privately insured autistic adults (N = 54,500) and age and sex-matched non-autistic adults (N = 109,000) in the United States. Autistic adults were included if they were 18-64 years old and had at least 1 inpatient or outpatient encounter with an International Classification of Diseases, 10th edition (ICD-10) code for autism (F84.0, F84.1, F84.5 F84.9). Beneficiaries without an autism ICD-10 code were considered non-autistic adults. Diabetes among autistic and non-autistic adults was identified via ICD-10 codes (E08.xx-E13.xx) corresponding to diabetes due to underlying condition, drug or chemical induced diabetes, type 1 diabetes, type II diabetes, and other specified diabetes. Using logistic regression, we estimated autistic adults’ odds of diabetes relative to non-autistic adults throughout adulthood at five-year age intervals (e.g., 18-22, 23-27), while controlling for demographic factors.

Results: 76% of included beneficiaries were between 18-27 years old, and approximately 73% of beneficiaries were male. Less than 1% of non-autistic adults, and 7.15% of autistic adults, had an intellectual disability. Most beneficiaries lived in the South or North-Central United States, and approximately 20% of beneficiaries lived in a rural residence. 5.15% of autistic adults and 3.07% of non-autistic adults in our sample had diabetes. Odds of diabetes increased monotonically at each five-year age interval for autistic adults (Figure 1). Autistic adults had a higher likelihood of diabetes than non-autistic adults at most five-year age intervals, with the greatest difference at ages 23-37 (OR = 2.67; 95% CI = 2.33-3.06) (Table 1).

Conclusions: Our results provide more generalizable estimates of diabetes prevalence for autistic adults than estimates that are currently available. Our findings suggest that autistic adults may be more likely than non-autistic adults to experience diabetes in adulthood. Thus, development of diabetes support services and programs that accommodate autistic adults’ individualized needs are important for future study to promote optimal diabetes outcomes for this population.

Prevalence of Autism Spectrum Disorder in Patients with Congenital Heart Defects

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Background: Congenital heart defects (CHD) are the most common birth defect in the United States. With recent advances in medical and surgical care, there has been a decrease in overall mortality, and consequently, a growing focus has been placed on these patients’ subsequent quality of life, including neurodevelopmental outcomes. Risk stratification has not been fully understood, however, a direct correlation between type of CHD and underlying genetic complexity, and severity of neurodevelopmental outcomes, has been established. Per the Centers for Disease Control and Prevention (CDC), the most recent prevalence estimate of autism spectrum disorder (ASD) in the United States among children 3-17 years of age is 2.5%. ASD has gained specific attention in children with CHD, with an odds ratio of 1.33 identified. The Modified Checklist for Autism in Toddlers (M-CHAT) is an ASD screening tool, with screenings at the age of 18 and 24 months recommended by the American Academy of Pediatrics to evaluate the risk of ASD in well children visits.

Conclusions:

Pilot data indicate that blue dye in muffins is a feasible way to detect delayed transit as well as altered lag phase dynamics. The Stripes Symptom Tracker facilitates prospective collection of symptoms in real time and reveals dynamics of how symptoms cluster with each other and change over time. Based on these pilot data, we next plan to validate these measures in a larger population of people across the autism spectrum to better understand autism-linked GI distress and provide tools for identifying helpful interventions.
Objectives: The goal of this retrospective observational study was to determine the prevalence of ASD in children with CHD with heart surgery performed in the first 3 months of life between September 2017 and December 2020.

Methods: Approval for this study was obtained from the Institutional Review Board. After reviewing the local electronic medical records of the Society of Thoracic Surgeons Congenital Heart Surgery Database, 94 patients met the inclusion criteria. Data pertaining to an M-CHAT at 18 and/or 24 months of age and the presence or absence of ASD diagnosis were documented.

Results: Of the 94 patients that met entry criteria for the study:

- 40/94 (42.5%) had at least one M-CHAT
  - 6/40 (15%) had 18 month M-CHAT only
  - 12/40 (30%) had 24 month M-CHAT only
  - 22/40 (55%) had 18 and 24 month M-CHAT
- 24/40 (60%) had M-CHAT scores in the elevated risk range
- 9/24 (37.5%) were referred for ASD evaluation
- 6/24 (25%) had documented diagnosis of ASD
  - Of patients diagnosed with ASD, on the 18 month M-CHAT, 3/6 (50%) had an elevated risk M-CHAT
  - Of patients diagnosed with ASD, on the 24 month M-CHAT, 4/6 (66.7%) had an elevated risk M-CHAT

Conclusions: Of the 94 CHD children evaluated in this study, 40 children (42.5%) had at least one M-CHAT; 24/40 children (60%) had an elevated risk on the 18 month and/or 24 month M-CHAT, while 6/40 children (15%) were diagnosed with ASD. The discrepancy in our observations raises the concern that the prevalence of ASD in this patient population might be underrepresented. It is important to perform screenings for developmental delays and to identify subjects with ASD to ensure these children are provided with access to developmental therapies, proper resources, and close follow-up.

416.298 (Poster) Primary Anxiety Diagnoses in a Clinical Sample of Autistic Teens with Intellectual Disability

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Background: Significant efforts have been made to understand the rates of anxiety symptoms in autistic youth with average cognitive abilities (van Steensel et al., 2017), however, less is known about the nature of anxiety symptoms in autistic youth with intellectual disability (ID). Autistic youth with ID are a complex and underserved population who have historically been excluded from anxiety research. Further, behavior and communication differences can make anxiety assessment particularly challenging in this population (Jennett & Hagopian, 2008). As such, very few studies have employed gold standard assessments to examine anxiety in this population. One study that did use a standardized assessment for autistic youth with ID (age 9-13) identified Specific Phobia as the most common diagnosis in this age group, followed by Social Phobia, and GAD (Kerns et al, 2020). It is unclear to what extent this pattern would change in adolescence. Knowledge of how anxiety manifests in adolescents with co-occurring ASD/ID is critical to informing care in this underserved population.

Objectives: The purpose of this study is to characterize patterns of anxiety, and identify rates of primary anxiety diagnoses among autistic teens.

Methods: Twenty-nine autistic teens with ID, ages 12-18 (and their parents), participated in a Facing Your Fears (FYF) anxiety treatment study which has been adapted for teens with ID (FYF: IDD). ASD diagnoses were ascertained using gold-standard diagnostic tools (ADOS-2; Lord et al., 2012). See Table 1 for participant characteristics. Parents were administered the ADIS: Autism Spectrum Addendum (ADIS:ASA, Kerns et al, 2017). Primary anxiety diagnosis was determined based on the highest Clinician Severity Rating (CSR, range=0-7) which incorporates parent reported levels of interference and disruption to daily life.

Results: While many teens met criteria for multiple diagnoses, the top two primary diagnoses based on the ADIS:ASA were Social Phobia (48%) and Generalized Anxiety Disorder (GAD, 29%). The other 23% of participants had either specific phobia, separation anxiety disorder, OCD, fear of change, or unspecified anxiety as a primary diagnosis (See Figure 1).

Conclusions: Autistic teens with ID are a markedly understudied group yet a critical population to serve given their mental health needs (Kucharchzket al., 2015). Results of the present study indicate that Social Phobia and GAD were the most common parent-reported primary anxiety diagnoses. Similarly, these were also identified as the top two primary anxiety diagnoses in autistic teens without ID (Reaven et al.,
2011). The pattern of increased social/generalized worries as youth enter adolescence is in line with a developmental progression of anxiety and has important implications for anxiety treatment. In addition, parents reporting GAD as a top priority in their teens with ID points to the potential value of CBT treatment that addresses broader anxiety symptoms. This is a departure from more common treatment approaches (i.e., behavioral analytic) used with autistic youth with ID, particularly those with specific phobias (Rosen, Connell, & Kerns, 2016). Limitations include a small sample size and the clinical nature of this trial (i.e., all families were actively seeking CBT treatment, potentially limiting a wider range of participants).

416.299 (Poster) Challenges in Understanding GI Dysfunction in Neurodevelopmental Disorders

Background:

There is a high prevalence of gastrointestinal (GI) problems in individuals with neurodevelopmental disorders (NDDs). However, type, frequency and impact of these problems has been variable and difficult to ascertain across individuals with rare genetic disorders and NDDs and those with idiopathic NDDs. While there are variabilities in symptom presentation between different forms of NDDs, there are also differences across different subtypes. In addition, it is unclear if individuals who are either non-speaking or cognitively disabled have the ability to express the source of their GI distress or are able access or tolerate appropriate diagnostic evaluations and treatments.

Objectives:

In order to better understand the prevalence in type of GI symptoms across those with different forms of NDDs, The Consortium for Neurodevelopmental Disorders and Digestive Diseases (CANDID) (www.candidgi.com) was formed in 2022. The goal of the collaboration was to better understand and help those with co-morbid GI problems and NDDs across the spectrum with different abilities and disabilities.

Methods:

A quantitative survey including the PedsQL and PROMIS for GI symptoms and Quality of Life (QOL) was administered to 717 caregivers with minor or adult children with either syndromic or idiopathic forms of autism spectrum disorder. This was done to determine prevalence and type of GI problems in children and the impact on families. Recruitment was conducted through patient advocacy groups and through autism organizations.

Results:

Constipation was the most common (p<0.05) disorder among respondents of the PedsQL, but other symptoms including nausea/vomiting, reflux, abdominal pain, diarrhea, dysfunctional swallowing, and bloating were also present at equal frequencies. Many of these children have sensory function impairment as well as medical complexities making sequelae difficult to document. A statistically significant (p<0.05) decrease in quality of life associated with GI disorders was identified in the adult population compared with other age groups, suggesting that as children age, QoL decreases. Constipation and abdominal pain worsened QOL scores by at least 1 SD. Unfortunately, the survey questions received qualitative feedback from respondents expressing that there were too many questions and that they could not adequately assess the GI dysfunction or pain in their non-speaking or cognitively disabled child, or the questions did not reflect the day-to-day realities of those families experiencing these problems.

Conclusions:

Constipation is the highest reported, but not only, GI problem experienced across those with NDDs. In order to better determine the source of GI distress, better subjective and objective measures need to be developed, especially for those who are non-speaking or have limited cognitive ability. This group is particularly vulnerable to the invasive testing required to properly diagnose some of these GI issues. This group (CANDID) represents a newly developed consortium of stakeholders dedicated to improving the detection and management of GI disorders in those with NDDs. Other needs identified include training of pediatric gastroenterologists and building repository data to share clinical results across researchers and clinicians.

416.300 (Poster) Repetitive Negative Thinking As a Prospective Predictor of Depression and Anxiety Symptoms in Autistic and Non-Autistic Incoming College Students
Background: Improving the understanding and treatment of mental health concerns, including depression and anxiety, are significant priorities for autistic adults (Benevides et al., 2020; Crane et al., 2019; Pellicano et al., 2014). While several theories have been proposed to explain the high prevalence of internalizing symptoms in autistic people, little longitudinal research has been done to investigate potential causal mechanisms. One potentially fruitful area of investigation is to explore how well-known contributors to depression/anxiety in the general population predict and/or moderate the development of internalizing symptoms in autistic individuals.

Objectives: The current study investigates the relation of one established risk factor from the general population, repetitive negative thinking (RNT), to internalizing symptoms over the course of college students’ first semester. We will also examine whether this association is moderated by a measure of autistic traits (Social Responsiveness Scale, Second Edition; SRS-2; Constantino & Gruber, 2012) and self-described autism status.

Methods: Students were recruited from four northeastern United States universities prior to their first semester at their university (in Fall 2020, Fall 2021, and Fall 2022). Our sample (N=263 total) includes 105 students who either reported a formal autism diagnosis (n=30) or endorsed a history of self and/or others thinking that they may be autistic (n=75), as well as 158 students with no history of autism. Participants completed a baseline survey battery within their first two weeks of starting college, a brief biweekly survey throughout their first semester (up to 24 times across 12 weeks), and an endpoint packet. Cross-sectional and longitudinal relationships of interest were assessed using general linear models and generalized least squares (GLS) regression (Pinheiro & Bates, 2000) with a first-order autoregressive correlation structure (AR1), respectively.

Results: Cross-sectional analyses on the full dataset (N=263) indicate that autistic (self-identified or clinically diagnosed) students tended to report greater repetitive negative thinking (F(1,252)=42.40, p<.001, d=0.83), as well as higher depression (F(1,257)=25.20, p<.001, d=0.64) and anxiety (F(1, 256)=26.49, p<.001, d=0.65) symptoms at baseline (see Table 1). Longitudinal analyses on the Fall 2020 and 2021 cohorts (n=144) demonstrated that elevated trait-like RNT at baseline prospectively predicted biweekly ratings of sadness (b=0.04, CI95%; 0.03, 0.05, f2 =0.11), anhedonia (b=0.04, CI95%; 0.03, 0.05, f2 =0.12), and anxiety (b=0.04, CI95%; 0.03, 0.05, f2 =0.11) symptoms across the semester, when controlling for SRS-2 scores and time trend (see Figure 1). A third wave of data will be added in January 2023 to supplement these longitudinal analyses.

Conclusions: These preliminary findings highlight RNT as a specific predictor of depression/anxiety that extends across neurotypes but may be especially prevalent in autistic adults. If causality continues to be supported, then RNT may be an important intervention target toward reducing the elevated depression and anxiety rates within the autistic community. Furthermore, understanding common factors in depression and anxiety treatment across populations may assist in increasing clinician confidence and competence in treating the underserved population of autistic adults with mood disorders (Maddock et al., 2020).

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416.301 (Poster) Results from the Specifying and Treating Anxiety in Autism (STAAR) Trial
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Background: Approximately 40%-80% of autistic children and adolescents exhibit clinically significant anxiety symptoms. These symptoms are associated with increased social deficits, depression, irritability, and stereotyped and self-injurious behaviors. Furthermore, youth with anxiety frequently avoid potentially stressful situations, missing opportunities to learn important skills. Multiple small trials provide promising evidence that selective serotonin reuptake inhibitors and cognitive behavior therapy (CBT) might reduce anxiety in autistic persons. However, there remains a need for a large, rigorously designed clinical trial that validates and compares the effectiveness of medication and CBT for treating anxiety in autistic youth. The COVID-19 pandemic also raised provocative questions about the relative efficacy of in-person versus online treatments.

Objectives: 1) To conduct the first 16-week randomized, placebo-controlled, comparative treatment trial to test the relative efficacy of a CBT called Behavioral Intervention for Anxiety in Children with Autism (BIACA), compared to sertraline and pill placebo; 2) To examine the efficacy of in-person versus online therapy.
Methods: The current sample consists of 56 of 60 expected participants ages 8-14 years and their parents who received hybrid (68%) versus fully online therapy (32%). They were qualified into the study using gold standard autism diagnostic (ADOS-2) and anxiety measurements (ADIS/ASA). They also were administered the Pediatric Anxiety Rating Scale (PARS), a brief clinician-rated semi-structured interview, which was used as the primary outcome measure, and will be reported here. They also were administered other secondary measures of anxiety, problem behaviors, and family adaptation. They were randomly assigned to receive CBT, sertraline, or pill placebo in a 1:1:1 allocation (n’s of 19, 19, and 18, respectively), with age and IQ used to stratify the sample. After randomization, participants received 16 weeks of CBT, sertraline, or pill placebo treatment. They then completed the post-treatment and 3-month follow-up assessments. The pill placebo group was then offered either medication or CBT treatment. All analyses were conducted in R using lme4 for fitting random effect models. Age at baseline was included as a covariate in all models. Higher order interactions with online status were also examined.

Results: A random effects growth model revealed a significant treatment by time interaction effect (F=3.96, p<.05). Simple effect comparisons revealed that PARS scores for the CBT group decreased (improved) over time significantly more than the placebo group (t=2.82, p<.01), and the Sertraline group decreased marginally more than the Placebo group (t=1.51, p=.13). There was no main effect or higher order interactions with online status.

Conclusions: Both CBT and sertraline resulted in decreased report of anxiety symptoms compared to the Placebo group, although results were only significantly better for the CBT group. Interestingly, the online rather than in person receipt of treatment did not appear to affect these results. Low hanging fruits for future work include studies of combination therapy, secondary outcome variables, and more rigorously controlled trials of online versus in-person therapy. All of these hold the potential to advance the treatment armamentarium for this debilitating problem in autistic youth and offer greater access to care.

416.302 (Poster) Sex Differences in Aggression and Anxiety in Adolescents and Young Adults, As Related to Autism
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Background:
Anxiety commonly co-occurs with Autism Spectrum Disorder (ASD), with approximately 40% of autistic individuals experiencing a social, specific, generalized, or other anxiety disorder (Zaboski & Storch, 2018). High anxiety in autistic individuals is correlated with increased aggression, rule-breaking, and obsessive-compulsive behaviors (Panju et al., 2015). Additionally, in neurotypical individuals, physical aggression is more prevalent in males (Lansford et al., 2012).

Objectives:
This project investigated the relationship between self-reported anxiety and aggression in youth with ASD as compared to non-autistic youth. In this study, we (1) examined sex differences in aggression and anxiety in youth ages 12-26 years with and without ASD, and (2) investigated whether this relationship differs in autistic females compared to autistic males.

Methods:
Data were collected from an NIH-funded study on sex and gender differences in ASD. The sample comprised of 30 autistic females, 45 autistic males, 43 neurotypical females, and 45 neurotypical males. This study included 3 gender-diverse individuals. All individuals were ages 12-26. ASD diagnosis was confirmed via the ADOS-2. Anxiety and aggression were assessed via CBCL-YSR and ABCL-ASR.

Results:
The full sample (neurotypical and autistic, n=163) showed a positive relation between anxiety and aggression (r=.58, p<.001); greater anxiety was related to greater aggression. This relationship was present in the autistic youth when analyzed separately (r=.42, p<.001); however, it was significant in autistic females (r=.47, p<.01) but not autistic males (r=.27, p=.08). The difference between the relationship in autistic females compared to autistic males was not significant (z=.95, p=.34).

Conclusions:
This study replicated findings by Panju et al.’s 2015 study of the relationship between anxiety and aggression in autistic individuals. We extended this finding to youth and young adult self-reported behavior. Our preliminary analyses suggest that the relationship may differ in autistic youth, based on their sex-assigned-at-birth. Follow-up analyses will examine additional individual characteristics in autistic individuals (e.g. parent report scores, family income) that may affect the relationship between anxiety and aggression.
References:


416.303 (Poster) Sex Differences in Anxiety Symptoms and Eye-Blink Rates in Children with Autism: Results from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT)


Background: Children with autism spectrum disorder (ASD) experience higher rates of anxiety disorders than typically developing peers with a prevalence rate of roughly 40% (Mingins et al., 2021; van Steensel et al., 2011). Spontaneous eye-blinking is an autonomic process, and rates are affected by emotional states, such as stress or anxiety. Spontaneous eye-blink rates (EBRs) predict abnormal dopamine activity, and dopamine plays a role in anxiety modulation (Jongkees & Colzato, 2016; de la Mora et al., 2010). Previous research has found that EBRs increase significantly during stressful situations or while watching stressful videos (Giannakakis et al., 2017; Korda et al., 2021). EBRs in relation to anxiety symptoms in autistic children has yet to be explored.

Objectives: The current study examined the relationship between EBRs and anxiety symptoms (AS) in autistic children. It was predicted that higher AS would be associated with increased EBRs. Exploratory analyses were conducted to examine sex differences in EBRs and AS.

Methods: Participants in this study included 211 autistic children (female=45, mean age=8.61±1.66 years) from the Autism Biomarkers Consortium for Clinical Trials. ASD diagnoses were confirmed with the Autism Diagnostic Observation Schedule, Autism Diagnostic Interview-Revised, and clinician endorsement of DSM-5 criteria for ASD. Parent-reported AS were assessed via the Child and Adolescent Symptom Inventory-5. ET data was recorded at 500 Hz using the SR Eyelink 1000+. ET data was collected while participants viewed 5 paradigms: activity monitoring (AM), biological motion (BM), interactive social task (SI), static scenes (SS), and visual search (VS). EBRs were calculated as number of spontaneous eye-blinks per paradigm and across the overall experiment. EBRs were normalized with a log base 10 transformation. T-tests were performed to compare AS and EBRs between groups and linear regression models were performed to test the relationship between AS, EBRs, and sex.

Results: Females had significantly higher AS than males (t(58)=2.6, p=.011), but significantly lower EBRs during the entire experiment (t(65)=2.1, p=.031) and SS (t(70)=2.07, p=.048). AS were not significantly related to EBRs across all paradigms. When sex was added to the regression model, there was a significant AS-by-sex interaction effect across the entire experiment (ß=.006, t=2.18, p=.029). The model was also statistically significant for SI (R²=.05, F(3,207)=4.28, p=.005). AS (ß~.007, t=2.492, p=.013), sex (ß~.07, t=2.648, p=.008), and the AS-by-sex interaction (ß=.01, t=3.178, p=.001) was significantly related to EBRs. Higher AS were only associated with increased EBRs for males (ß=.003, t=1.984, p=.049; Fig. 1).

Conclusions: Consistent with our hypothesis, results indicated higher AS were associated with increased EBRs, however, this effect was only seen in autistic males. This partially replicates findings in other populations. One potential explanation for this effect being unobserved in autistic females might be that, consistent with social camouflaging, females may be attempting to suppress physical expressions of their anxiety, resulting in lower EBRs and increased AS. This study also reports a novel finding that autistic females have lower EBRs than autistic males. Results suggest it is important to consider sex and co-occurring psychiatric conditions when studying EBRs in autistic populations.

416.304 (Poster) Sex Differences in Predictors of Mental Health Symptoms Level and Growth across Childhood in Autism

Background: More males than females receive an autism diagnosis, and females who are diagnosed show greater etiologic risk factors (e.g., a greater genetic mutational load)[1]. Also, higher levels of co-occurring intellectual disability or emotional and behavioural problems predict autism diagnosis in girls (given equal autism symptoms).[2] Consistent with this, we have shown in this sample that girls with autism show substantially higher rates of disruptive behavioural, anxious-depressed and attention problems relative to their same-sex typically developing peers. No previous study has examined whether risk factors for mental health symptoms show a greater association with mental health symptoms in girls than boys.

Objectives: To identify possible sex differences in predictors of level and growth of mental health symptom across childhood in autistic children

Methods: The Canadian Pathways in ASD study enrolled children with ASD (n=398; 63 girls) who were assessed eight times from the time of diagnosis (age 2-4 years) to age 10.5 years. Mental health problems were assessed using the parent-report Child Behaviour Checklist [4,5] aggression, attention problems and anxiety-depression syndrome scales. Predictors of these symptoms included socio-demographic risk (indexed by family income), autism symptom severity (ADOS social affect and repetitive and restricted behaviour [RRB] [5]), and IQ assessed using the Weschler Intelligence Scales for Children[6]. Growth curve models were fitted with a scaling factor to accommodate the change from the preschool to school age questionnaires.

Results: A significant sex difference was found in prediction from income to all three mental health dimensions. Lower income was more strongly associated with higher levels of disruptive behaviour and anxious-depressed symptoms, and with higher growth in rates of disruptive behaviour, anxious-depressed and attention problem symptoms over childhood, in girls compared to boys. A significant sex difference was seen in prediction from ADOS social affect problems to growth of aggression and anxious-depressed symptoms, with opposite effects in boys and girls. That is, social affect problems were associated with improving symptoms over childhood in girls and worsening symptoms over childhood in boys. No sex differences obtained in IQ; lower IQ predicted increased behavioural problems and attention problems similarly in both sexes. RRB problems also showed no sex differences and were not significantly associated with mental health symptoms.

Conclusions: Lower income showed a stronger association with levels and growth of mental health symptoms in autistic girls than in boys. Given a consistent association between lower income and mental health in typical development in both sexes, this may suggest distinct aetiologies for co-occurring mental health symptoms in autistic boys. The finding may also be consistent with females requiring more risks factors to receive an autism diagnosis, given that diagnosis is more likely with accompanying mental health symptoms. Social affect problems were a risk for mental health symptoms in boys, but surprisingly appeared to be protective for growth in symptoms over time in girls. Examining why increased social difficulties would lead to reducing mental health symptoms in girls who receive an early diagnosis of autism is an important topic for future research.

416.305 (Poster) Shared Pathways to Anxiety in Individuals with Moderate-Profound Intellectual Disability: The Role of Characteristics Associated with Autism across Diagnostic Groups

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Background: Anxiety is common in autistic individuals with intellectual disability (ID) and some genetic syndromes associated with both autism and ID. Correlates of anxiety in autism that inform models of possible causal pathways to anxiety include sensory processing differences, repetitive behaviour, health conditions and intolerance of uncertainty. However, a paucity of research examines correlates of anxiety that cut across diagnostic groups associated with ID, while controlling for autism characteristics. Identifying common correlates of anxiety across groups will inform models of anxiety, determine the possible role of autistic characteristics and contribute to the development of transdiagnostic interventions.

Objectives: To determine the associations between anxiety, repetitive behaviour, sensory processing differences, health conditions and intolerance of uncertainty, across diagnostic groups associated with moderate-profound ID, while controlling for autism characteristics.

Methods: Parents/carers completed an online questionnaire battery including the Wessex Questionnaire (a proxy measure of adaptive ability), the Social Communication Questionnaire (SCQ), Repetitive Behaviour Questionnaire-2 (RBQ-2), Health Questionnaire, subscales
from the Sensory Profile-II, the Responses to Uncertainty and Low Environmental Structure (RULES) Questionnaire and the Anxiety, Depression and Mood Scale (ADAMS).

Results: Parents/carers of 165 individuals with ID participated (55.8% male; $M_{age}=20.9$ years ($SD=11.1$), range: 4-63). Diagnoses included autism ($n=38$), autism with a diagnosis of a genetic syndrome ($n=34$) and a diagnosis of a genetic syndrome or ID alone ($n=93$). Diagnosis, autism characteristics, age, gender, ability level, and verbal ability were entered as potential covariates in hierarchical regression analyses. There were group differences based on diagnosis, whereby individuals with Cornelia de Lange and Fragile X syndromes appeared to have similar anxiety scores to autistic individuals, whilst those with Angelman syndrome and heterogeneous diagnosis had significantly lower scores. All other covariates did not significantly predict anxiety. Diagnosis was no longer significant when the variables of interest were entered into the model; higher frequency of health conditions and intolerance of uncertainty predicted higher levels of anxiety ($p=.002$; $p<.001$ respectively) with a trend towards significance for auditory sensory processing differences ($p=.012$). This model explained 61.9% of the variance in anxiety scores. Visual and tactile sensory processing differences and repetitive behaviour were not significant predictors of anxiety.

Conclusions: Health conditions and intolerance of uncertainty are associated with anxiety in both autistic and non-autistic individuals with moderate-profound ID of heterogeneous aetiology. Auditory hyperreactivity may play an important role in the experience of anxiety rather than auditory hyporeactivity or sensory seeking; although further exploration of these relationships are needed in this group. These correlates cut across groups, demonstrating shared correlates associated with moderate-profound ID that underpin anxiety risk. This is crucial considering individuals with varying diagnoses will present to the same clinical services. Identifying potential pathways between health conditions, intolerance of uncertainty and anxiety informs models of the development and maintenance of anxiety, and indicates targets for the development of tailored anxiety interventions.

416.306 (Poster) Sleep Characteristics of Infants with Down Syndrome, High Familial Likelihood of Autism, and Low Familial Likelihood of Autism


Background: Typically developing (TD) infants sleep 12-16 hours in the first year of life. Sleep challenges for school-age children with Down Syndrome (DS) and autism have been previously described; however, there are few studies on sleep in infants with DS or high likelihood of autism (HL). Infants with DS may sleep 1 hour less per night than TD infants (Yau et al., 2019) and infants later diagnosed with autism may show increased sleep onset latency in the first year of life (MacDuffie et al., 2020). Identifying differences in sleep characteristics across infants with DS, HL, and low familial likelihood of autism (LL) could lead to targeted sleep interventions to support healthier outcomes.

Objectives: We aimed to identify differences in quantitative and qualitative sleep characteristics in three age-matched groups (DS; HL; LL) at 6 and 12 months of age.

Methods: Participants were part of the multi-site Infant Brain Imaging Study (IBIS). Sleep in 159 infants at 6 months (DS=35, HL=81, LL=43) and 111 at 12 months (DS=34, HL=57, LL=20) was assessed by parent-report on the Brief Infant Sleep Questionnaire (BISQ), yielding hours of night sleep, daytime sleep, sleep onset latency, and night wakefulness. An analysis of variance was conducted with post hoc pairwise comparisons. Qualitative information on concern about infants' sleep, home sleeping arrangements, method used for falling asleep, and sleep position was obtained.

Results: The DS group had significantly fewer parent-reported hours of night wakefulness compared to the LL and HL groups at 6-months (fig. 1). There were no significant differences across groups for total hours slept during the night, hours slept during the day, or sleep onset latency. DS group parents reported significantly less concern about their child’s sleep than LL and HL at 6-months (Fisher exact test, $p=0.023$). Parent concerns increased from 6 to 12 months for the DS and HL groups, but not the LL group; however, there were no significant group differences in parent concerns at 12 months. Sleeping arrangements at 6 months were infant 1) in parent’s room/crib (DS 53%, HL 43%, LL 23%), 2) in separate room (DS 35%, HL 33%, LL 54%), and 3) in parent's bed (DS 60%, HL 17%, LL 09%). At 12-months, sleeping arrangements were infant 1) in parent’s room/crib (DS 31%, HL 18%, LL 14%), 2) in separate room (DS 63%, HL 58%, LL 72%) and 3) in parent's bed (DS 60%, HL 14%, LL 14%).

Conclusions: Parents of DS infants have less concern and report less time awake at night compared to HL and LL infants at 6 months of age. Objective measures are needed to determine whether this reflects differences in sleep or in other domains (temperament or motor).
Parent sleep concerns increase notably for the DS and HL groups from 6 to 12 months of age. Sleeping arrangements appear to vary by group in the first year of life. Future research is needed to understand whether neurobiological differences might be associated with parent-reported sleep concerns and what may be driving parent choices about infant sleeping arrangements.

**416.308 (Poster)** Sleep Disturbance in Autistic Children and Adults in the EU-AIMS LEAP Cohort: A Follow up Study

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**Background:** High rates of sleep disturbances in autistic individuals are common, and remain throughout development. Given the negative impact of sleep disturbances in the manifestation of autism characteristics, or vice versa, it is a must to understand factors (e.g., sensory, mental health, etc.) which may be contributing to long-term sleep disturbances in autism. To date, most longitudinal sleep studies have focused on children, and little emphasis has been placed on autistic individuals beyond childhood.

**Objectives:** To investigate the type of sleep problems in autistic and non-autistic individuals that are maintained through development; To study mid-term predictors of continued sleep disturbances in autism across ages.

**Methods:** A very well-characterized cohort of autistic and non-autistic individuals between 6 and 30 years of age were assessed as part of the multi-centre EU-AIMS Longitudinal European Autism Project (Charman et al., 2017; Loth et al., 2017) during baseline, T1, and 18-24 months later, T2. Sleep disturbances were studied with the Child Sleep Habits Questionnaire (parent report version for 6-11 years-olds) or the self-report adolescent version (for over 11 years of age). Individuals with completed sleep questionnaires at both time points by the same reporter were selected for this study. This resulted on 33 autistic (mean age at T2 =17.19(3.89)), and 39 neurotypical (mean age=17.86(4.27)) adolescents/adults, and 34 autistic (mean age=8.96(0.93) and 17 neurotypical (mean age= 9.04(1.24)) children, none with intellectual disability. At both time points, autistic symptomatology was characterized with the ADOS, Social Responsiveness Scale (SRS), Short Sensory Profile (SSP), and Repetitive Behaviours Scale (RBS). Comorbidities were characterized using the ADHD DSM-5 checklist, and Beck questionnaires for Anxiety and Depression.

**Results:** The rate of disturbances at T2 were not, on average, significantly different to those at T1 in any of the groups (i.e., autism vs non-autism) or ages (i.e., children or adolescents/adults). However, autistic adolescents/adults presented more bedtime resistant behaviours than non-autistics (p=.016), and sleeping times, on average, were significantly longer for autistic individuals (p=.018). Autistic children, and similar to baseline, scored significantly higher (more disturbed) than non-autistic in all subscales (all p<.039), except for disordered breathing. SSP, SRS, RBS and the ADOS collected at T1 were used as predictors for total sleep disturbance in T2. All four factors together contributed to predict the rate of sleep disturbances in children (R=.37,F\(_{3,49}=6.84\), p<.001), but none of them were significant for adolescents/adults (p=.113). Anxiety, depression and ADHD symptomatology from T1 were entered in a different model to study possible mental health conditions to affect long term sleep disturbance. Depressive symptomatology at T1 predicted disrupted sleep in children at T2 (R=.43, F\(_{3,47}=11.81\), p<.001), but ADHD and depression in adolescents/adults (R=.13, F\(_{2,69}=5.09\), p=.009).

**Conclusions:** Sleep problems persist throughout development in autism, and the rate continues to be greater than in non-autistics. Autism core characteristics seem to predict long term sleep problems in children but not in adolescents/adults. Depression at earlier ages predict later sleep problems. Treating some of these conditions at early ages may help improving later sleep disturbances and overall quality of life of those living with poor sleepers.

**416.309 (Poster)** Sleep Problems in Autistic Youth and Maternal Mental Health

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**Background:** Sleep problems are common in autistic youth and have been linked with mental health problems in parents. Understanding this relationship could reveal modifiable mechanisms and support the development of family system interventions. This study advances the literature by utilizing a large inpatient sample enriched for psychiatric and behavioral problems, which are known correlates of both sleep problems in autistic youth and poor mental health in parents.

**Objectives:** To evaluate interconnections between child sleep problems and maternal mental health problems.
Methods: Participants were 356 youth with ADOS and clinically confirmed autism and their biological mothers. Participants were enrolled at the time of hospital admission to a participating site of the Autism Inpatient Collection. Mothers completed questionnaires about the presence and nature of their child’s sleep problems prior to admission and family psychiatric history. Binary logistic regressions evaluated if sleep problems in autistic youth predicted self-reported maternal diagnoses of depression and/or anxiety controlling for demographic characteristics, level of impairment, (i.e., autism severity, non-verbal IQ, and verbal ability), and externalizing/internalizing symptoms (as measured by the Child Behavior Checklist) in children. Parenting stress was also evaluated as a mediator and/or moderator of associations between children’s sleep problems and maternal mental health in a subset of 231 participants who completed the Parenting Stress Index. Exploratory analyses evaluated the moderating effect of covariates on outcomes.

Results: Child participants were 12.0±3.3 years old, 82.6% male, 93.3% white, 37.4% minimally verbal, and 36.5% with comorbid intellectual disability. Biological mothers were 42.3±8.1 years old, 64% were married or living with a partner, 79% had at least some college education, and 52.2% had an annual household income greater than $50k. Of the 356 child participants, 45.2% had difficulty falling asleep, 44.7% had frequent nighttime awakenings, and 12.1% had early morning awakenings and the inability to return to sleep. Of the 356 maternal participants, 47.2% reported depression diagnoses and 53.1% reported anxiety diagnoses. In fully adjusted models, biological mothers of children with difficulty falling asleep were 79% more likely to report depression (OR: 1.79, 95% CI: 1.1-3.0) and those of children with frequent nighttime awakening were 75% more likely to report anxiety (OR: 1.75, 95% CI: 1.0-3.0). There was no main effect of early morning awakening on maternal mental health; however, moderation analyses revealed that early morning awakening increased risk for maternal depression in mothers of school aged children (X²=4.9, p=0.03) but not pre-teens or adolescents. Parenting stress did not mediate or moderate associations between sleep and maternal mental health.

Conclusions: Sleep problems in autistic youth may increase risk for self-reported depression and anxiety in biological mothers. Alternatively, because directionality cannot be determined with this data, it is possible that depression or anxiety in mothers may increase sensitivity to sleep problems in autistic youth. Future studies should seek to identify mechanisms linking sleep problems in autistic youth and maternal mental health problems and evaluate if interventions to improve sleep problems in autistic children have collateral benefits for maternal mental health and the factors that moderate intervention success.

416.310 (Poster) Sleepy Tots: Contributors to Sleep Disturbance in Young Children with and without Autism
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Background: Sleep health has been directly linked to critical health outcomes like cognitive and physical development, emotional regulation, and mental health (Matricciani et al., 2019). Insufficient sleep in young children can lead to downstream health effects if left untreated. While high rates of sleep disturbances has been demonstrated for autistic children (6-12) (van der Heijden et al., 2018) and young adults (ages 18+) (Jovevska et al., 2020), research characterizing sleep in young autistic children (ages 2-5) is limited. Further, it is unclear whether depressive or anxiety characteristics to sleep problems at this young age. Understanding these relationships directly inform intervention choices and lead to more effective and targeted care.

Objectives: We aimed to (i) examine differences in parent-reported sleep for young children (ages 2-5) with and without autism and (ii) understand Whether parent-reported child depressive and anxiety characteristics account for sleep differences within groups.

Methods: Participants were drawn from a larger protocol adapting the Emotion Dysregulation Inventory (Mazefsky et al., 2018) for young children (Day et al., 2022). Participants with complete data were divided into two groups for this secondary data analysis: those with a parent-reported autism diagnosis (ASD) and those without (NON). Three PROMIS Early Childhood Measures were completed: Sleep Problems 8-item short form (Lai et al., 2022), Depressive Symptoms 10 item short form (Sherlock et al., 2022), and Anxiety 8 item short form (Sherlock et al., 2022). A stepped multivariable linear regression assessed the differences between groups and the contribution of child depressive and anxiety characteristics on sleep disturbances after controlling for age, sex, parent education, and total score of the Social Communication Questionnaire (Rutter et al., 2003), a measure of autism features.

Results: A total of 1,766 parents completed the sleep, anxiety, and depression PROMIS measures (nASD=1,077, nNON=689). Relative to children without autism, autistic children experienced significantly greater sleep disturbance (Table 1). Specifically, 58% of parents of autistic children and 28% of parents of children without autism endorsed sometimes for at least 1 item. Twenty-seven percent of parents of autistic children and 9% of parents of children without autism endorsed “almost always” on at least 1 sleep item.

In the final adjusted regression model (Model 4, Table 2), group differences in sleep disturbances were sustained (F=99.17, p<.001, R²=0.37). When depression and anxiety were included as covariates, depressive characteristics accounted for an additional 15% of variance in sleep (change in R²). Anxiety characteristics accounted for an additional 4% of variance when added to the model (change in R²).

Conclusions: Sleep impairment is evident even in young age for autistic children. Further, when accounting for depression and anxiety characteristics, sleep problems persist. These findings suggest that sleep problems must be addressed independently from, but perhaps in
tandem to, mental health interventions for depression or anxiety.

416.311 (Poster) Static and Dynamic Measures of Sleep and Self-Injury in Autistic Children with Intellectual Disability.
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Background: Persistent poor sleep is commonly reported by parents of autistic individuals (Richdale & Schreck, 2009) with reduction in total sleep time noted for autistic individuals with intellectual disability (ID; Elrod & Hood, 2015). Self-injury is also reported at high rates in autistic individuals with co-occurring ID (Richards et al., 2012; Steenfeldt-Kristensen et al., 2020). Some studies have demonstrated a relationship between sleep problems and self-injury (Brylewski & Wiggs, 2004; DeLeon et al., 2004) with the suggestion that poor sleep leads to tiredness which acts as a setting event for self-injury (Carr & Smith, 1995). However, these studies are limited by their reliance on informant-report measures of sleep, which prevents evaluation of the relationship between self-injury and specific sleep parameters.

Objectives: To use overnight actigraphy to study objective habitual sleep parameters, and their relationship with self-injury, in the home environment.

Methods: Caregivers of 95 autistic children with ID (M age [SD] =10.52 years [2.60]; N males =70) completed questionnaire measures about their child’s sleep, using the Child Sleep Habits Questionnaire (CSHQ, Owens et al., 2000) and self-injury, using the Challenging Behaviour Questionnaire (CBQ, Hyman et al., 2002). Of these, 32 children who showed self-injury on a weekly basis were invited to take part in a 10 day at home assessment of sleep and behaviour using the CamnTech MotionWatch 8. Caregivers completed a diary about their child’s sleep and recorded whether or not self-injury occurred in continuous 2-hour periods throughout the assessment period. Teachers completed behaviour diaries to record occurrences of self-injury at school. Of this sample, 28 children were able to tolerate the actigraphy assessment for at least 5 nights (M age [SD] =10.43 years [2.99]; N males =21).

Results: Sleep problems and self-injury were commonly reported in the sample of 95 children, with 60 participants reported to show self-injury on at least a daily basis and 93 scoring above the clinical cut-off for sleep problems on the CSHQ (Owens et al., 2000). There was no significant correlation between self-injury severity according to the CBQ and the total or subscale scores of the CSHQ in the wider sample. For the 28 children who took part in the actigraphy assessment, sleep parameters were objectively poor with difficulties with sleep onset latency (M=37 minutes, range <1 minute – 3 hours 56 minutes), night waking (M=65 minutes, range 26 minutes – 2 hours 10 minutes) and sleep efficiency (M=82.93%, range 57.60-92.20%). The number of time periods in which self-injury was recorded across the assessment period was significantly correlated with the mean sleep efficiency at group level (r [26] =-.343, p =.037).

Conclusions: This study provides further evidence of objective and subjective sleep disturbance in a large sample of autistic children with ID. Preliminary results indicate that number of time periods in which self-injury occurred has a negative relationship with sleep efficiency, highlighting the importance of using dynamic measures of sleep and behaviour, as part of an at-home extended assessment, rather than relying on static informant-report measures.

416.312 (Poster) Testing the Stability of Co-Occurring Mental Health Difficulties in a Longitudinal Cohort Study of Autistic Youth
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Background: Experiencing a particular mental health difficulty is a strong predictor of experiencing the same difficulty later in life, a phenomenon known as homotypic continuity. However, the experience of particular early psychological difficulties also predicts different difficulties later on, a phenomenon known as heterotypic continuity. While both continuities have been well-established in neurotypical samples, there is limited evidence examining the trajectory of homo- or heterotypic continuity of mental health difficulties in young people with autism. The small number of existing studies have failed to adjust for possible confounders or only examined individuals at two developmental timepoints, possibly masking more complex fluctuations over time.

Objectives:
To clarify the trajectory of homo- or heterotypic continuity in autistic youth by using a prospective cohort study to examine the association between mental health syndrome scales, measured at three different timepoints through childhood and adolescence.

Methods:

Participants were prospectively measured as part of the Pathways in ASD study, a large Canadian cohort study of autistic youth (n = 421, 85% male). Mental health data were collected using the Child Behaviour Checklist (CBCL) at multiple timepoints through childhood. We used CBCL data collected at 2-4 (Time 1), 7-8.5 (Time 2), and 10-12 years of age (Time 3). Analyses used the Anxious/Depressed, Aggressive Behaviour and Attention Problems subscales. Associations between the subscales at the three timepoints were examined using regression analyses. Hypothesised confounding variables (sex, IQ, autism symptom severity, social economic status, parental mental health, and recruitment site) were included in analyses.

Results:

Subscale scores at earlier timepoints were associated with their equivalents at later timepoints – evidence of homotypic continuity. Scores at Time 1 were associated with the same scores at Time 2 (Anxious/Depressed β = .32, p = .001; Aggressive Behaviour β = .34, p < .001; Attention Problems β = .27, p = .001) and Time 3 (Anxious/Depressed β = .15, p = .041; Aggressive Behaviour β = .30, p = .002; Attention Problems β = .16, p = .013). Evidence for heterotypic continuity was limited to one cross-subscale association – Aggressive Behaviour scores at Time 1 were negatively associated with Anxious/Depressed scores at Time 3 (β = -.22, p = .017).

Conclusions:

Mental health symptoms are consistent across childhood development for autistic youth. These results demonstrate the importance of the early identification of, and intervention for, mental health difficulties. There is less evidence for heterotypic continuity in this population, which suggests that a single p factor may not underlie multiple conditions, and that the increased prevalence of different psychological disorders among autistic populations may each require their own explanatory framework. It may be the case that pathways of developmental change are fundamentally different in autistic populations compared to typically developing populations; further research is required to adequately answer this question.

416.313 (Poster) The Association between Emotion Regulation, Autism Traits, Borderline Personality Traits and Childhood Trauma: A Comparison between Adults with ASD and Adults with BPD.

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Background: Difficulties in emotional regulation are considered a transdiagnostic condition that affects a large number of diagnostic categories. Two of these are Autism Spectrum Disorder (ASD) and Borderline Personality Disorder (BPD). There is evidence of overlapping in some characteristics of both disorders (e.g., cognitive inflexibility), however the evidence on the relationship of clinically relevant variables with difficulties in emotional regulation in these two populations is scarce.

Objectives: The objective of the present study is to compare the scores on measures of autism, borderline personality, and childhood maltreatment in two groups of people with ASD and BPD, as well as to study the relationship of these variables with difficulties in emotional regulation.

Methods: Two groups of adult participants were recruited from the ASD (n = 53) and BPD (n = 44) specialized outpatient programs of a Tertiary Hospital. Exclusion criteria were established as a full-scale IQ of less than 70 in the participant with ASD and language and cognitive barriers in the respondents, as determined by clinical judgment. Assessment instruments included self-reported measures of autism (Autism Quotient Short-Form, AQ-Short), borderline personality (BPD Checklist, BPD-CL), childhood maltreatment (Childhood Trauma Questionnaire, CTQ), and emotional regulation (Difficulties in Emotion Regulation Scale, DERS). A set of independent t-tests were conducted comparing the two clinical groups on the study variables. Correlation analyses were performed using Pearson’s r in order to assess the association between the dependent (emotion regulation) and independent (sex, age, autism traits, borderline personality features, and childhood maltreatment) variables. Finally, two set of regression analyses using the stepwise method were carried out for each clinical group with the emotion regulation score (DERS Total) as an outcome and those variables whose correlations showed statistical significance (p < 0.05) as predictors. Only subscale scores were taken into account for the regression analyses.

Results: Compared with the ASD group, participants with BPD showed significantly more self-reported emotional regulation difficulties and reported a significantly higher prevalence of childhood sexual abuse. Within participants with ASD, emotion regulation difficulties was associated with all core features of the AQ-Short, but the strongest association was with switching subscale. Also in this group, all the BPD-CL subscales and the total score moderately correlated with difficulties in emotional regulation, even more than in the BPD group.
Only the emotional and physical neglect subscales were significantly associated with difficulties in emotional regulation in BPD participants. Regression analysis for ASD found BPD-CL affective instability, AQ-Short switching, female sex, and BPD-CL impulsivity to positively predict difficulties in emotional regulation. These variables explained 67% of the variance in emotional regulation difficulties. Transient paranoid/dissociative BPD-CL, AQ-Short switching, and female sex positively predicted difficulties in emotional regulation in the BPD group, with this model accounting for 42% of the variance.

Conclusions: The results suggest variables specifically related to difficulties in emotional regulation that could be considered when dealing with differential diagnosis between ASD and BPD adults. The small sample size and the lack of objective measures compromise the generalizability of the results. Future research on the present topics are warranted.

416.314 (Poster) The Longitudinal Relationship between Social Motivation and Depressive Symptoms in Autistic Adults

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Background: Autistic adults as a group have high mental health needs, with depression being one of the most common and clinically significant outcomes among this population. Identifying pathways to depressed mood in autistic adults may help to build resources for this underserved community, as causal contributors may translate to treatment targets around which to improve intervention efficacy. Smith and White’s (2020) social motivation model suggests that when there is a discrepancy between desire and opportunity for social connectedness, autistic adults become lonely, which then leads to depression; they postulate that, when desire and opportunity for social connectedness are both low, this lack of a discrepancy protects against loneliness and depression. In contrast to this model, empirical findings suggest that low desire for social interaction still correlates with loneliness and subsequently depressive symptoms (Han et al., 2019).

Objectives: We aim to test if social motivation moderates the relationship between social success and loneliness, such that individuals with greater social motivation and lower reported social connectedness will report higher levels of loneliness than participants with low social motivation. We further hypothesize that loneliness will prospectively predict growth in depressive symptoms over time in autistic adults.

Methods: Sample 1 includes autistic adults (AUT; N=49), non-autistic depressed adults (DEP; N=30), and non-autistic, non-depressed controls (CON; N=28) recruited locally for an in-person study. Measures included the Social Responsiveness Scale (SRS-2) as a proxy for social impairment, Loneliness in Context Questionnaire (LiCQ), and the Beck Depression Inventory-II (BDI-II). Sample 2 includes autistic adults (N=300) recruited through the SPARK online registry and surveyed three times within six months. Here, the PROMIS Emotional Support items and Satisfaction with Participation in Discretionary Social Activities items were used as an index of social connectedness, and the Overall Depression Severity and Impairment Scale (ODSIS) measured depressive symptoms. In both samples, the Anticipatory and Consummatory Interpersonal Pleasure Scale (ACIPS) indexed social motivation.

Results: Across diagnostic cohorts in Sample 1, the ACIPS (t(96) =2.52, p =0.01) significantly moderated the relationship between SRS-2 scores and loneliness (i.e., adults who reported high social motivation but also high social impairment were more likely to endorse loneliness). Further, loneliness (LiCQ) was the strongest predictor of depressive symptoms in the transdiagnostic sample (t(94)=8.02, p<0.001, adjusted R2 =.49) and AUT cohort alone (t(41)=3.41, p=0.001, adjusted R2=.33). Importantly, by the INSAR 2023 conference, we will have all three follow-up longitudinal waves collected to test if these patterns hold longitudinally, and with a more purposeful marker of social connectedness.

Conclusions: For socially motivated autistic individuals, the discrepancy between desire and opportunity for social interaction may lead to higher levels of loneliness, which then contributes to depression. These findings stand to enhance our understanding of social reward processes as a potential contributor to depression among autistic adults, with the ultimate goal of improving our ability to predict and intervene in those at risk for mood disorders.

416.315 (Poster) The Moderating Role of Reward Activation on the Link between Rumination and Withdrawn/Depressive Symptoms in Autistic Adolescents

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Background: A meta-analysis has demonstrated that as compared to neurotypical people, autistic people demonstrate differences in brain reward network activation (processes as reward and punishment) in response to both external social (i.e., smiling faces) and monetary feedback (Clements et al., 2018). Given findings of altered reward activation in depressed adolescents (Forbes et al., 2006) and its associations with depressive symptomatology in neurotypical individuals, but not autistic individuals (e.g., Schalbroeck et al, 2021), we were interested in what individual differences might impact these associations. Rumination, a response style in which one repetitively focuses on negative mood or thoughts, has been theorized to potentiate withdrawn/depressed symptoms, such that it may provide an evidence-base that justifies withdrawal and this cycle of rumination and withdrawal can be reinforced as it reduces exposure to aversive situations (Nolen-Hoeksema et al., 2008). Greater rumination has been found in autistic vs. neurotypical samples. Considering the
relatively high rates of depressive symptoms in autism, we were interested in whether rumination, reward function, or their relationship could help to explain withdrawn/depressed symptoms in autistic adolescents.

**Objectives:** We aimed to (1) examine reward network activation during a loss condition in response to monetary reward in autistic vs. neurotypical adolescents, and (2) examine the role of reward mechanisms on the link between rumination and withdrawn/depressed symptoms in autistic adolescents.

**Methods:** Data were collected on 25 autistic (M(SD) age = 14.95(2.47) years) and 23 neurotypical adolescents (M(SD) age=15.5(2.76) years). Participants completed a coin toss task while undergoing a functional MRI scan. During the task participants were instructed to predict the result of a coin toss (heads/tails) with blocks characterized by winning or losing. A Region of interest (ROI) anatomical mask was derived from the Harvard-Oxford subcortical parcellation for dorsal striatum (caudate, putamen). Group differences for loss blocks were analyzed using AFNI 3dtest++ at p<.005, with an empirical contiguity threshold of 16 voxels within the ROI. Average beta weights were extracted for each participant for moderation analysis. Moderation was used to examine levels of reward activation on the link between rumination (Response to Stress Questionnaire) and withdrawn/depressed symptoms (Child Behavior Checklist) using SPSS PROCESS.

**Results:** The autistic group demonstrated diminished activation in an 18-voxel sub-region of the dorsal striatum, compared to the neurotypical group (Talairachx<sub>1</sub>=-14, 21, 38; Figure 1). Within the autistic group, dorsal striatal activation moderated the relationship between rumination and withdrawn/depressed symptoms (B=-.16, SE=.062, p<.05, ΔR<sup>2</sup>=.23), such that at lower dorsal striatal activation, greater rumination predicted greater withdrawn/depressed symptoms, while at higher levels of dorsal striatal activation greater rumination predicted lower withdrawn/depressed symptoms (Figure 2).

**Conclusions:** Consistent with previous work examining neural differences in response to reward, the autistic group demonstrated decreased dorsal striatal reactivity to loss compared to neurotypical adolescents. Dorsal striatal activation moderated the role of rumination on withdrawn/depressed symptoms in autism. These results suggest that for those who are less affected by external feedback, rumination is associated with depression. Yet for those who are more affected by external feedback, having the ability to ruminate might buffer against depression symptoms.

### 416.316 (Poster) The Relationship between Anxiety Symptoms and Adaptive and Social Functioning in Children with Autism Spectrum Disorder

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Background: Anxiety is one of the most diagnosed comorbidities in children with ASD, occurring in about 40% of all cases (van Steensel et al., 2011). While deficits in social communication skills and adaptive behavior are considered core features of ASD, few studies have examined the relationship between these features and anxiety symptoms. Understanding the relationship between ASD and comorbid anxiety symptoms is an imperative first step in developing and delivering effective treatment and support.

**Objectives:** This project had two objectives. First, we examined the relationship between anxiety symptoms and adaptive and social functioning in children with ASD. Secondly, we examined the difference in social and adaptive skills of children with and without anxiety.

**Methods:** The study included 43 children aged 4-9 years old (M = 6.58 years, SD = 1.35). All children had an ASD diagnosis as confirmed by the Autism Diagnostic Observation Schedule (ADOS). Anxiety symptoms were assessed using the CBCL (1.5-5 (n = 21), 6-18 (n = 22). Parents also completed an assessment capturing their child’s adaptive behavior (VABS-3) as well as an assessment measuring their child’s social functioning (SRS-2).

**Results:** 1) CBCL anxiety subscale scores were negatively correlated with the VABS-3 Daily Living Skills domain (r(41) = -.37, p = .014). CBCL anxiety subscale scores were also negatively correlated with the VABS-3 Interpersonal Relationships subdomain (r(41) = -.30, p = .048). CBCL anxiety subscale scores were positively correlated with the SRS-2 Total Score, (r(41) = .48, p = .001; SRS-2 Social Cognition, r(41) = .42, p = .005; SRS-2 Social Communication r(41) = .42, p = .005; SRS-2 Social Motivation, r(41) = .38, p = .012, and SRS-2 RRIs, r(41) = .49, p < .001. 2) Participants who scored in the borderline or clinically significant range on the CBCL anxiety subscale (n = 16) had significantly lower adaptive and social skills than participants who scored below the clinical threshold (n = 27) on the VABS-3 Daily Living Skills, t(41) = -2.1, p = .041; VABS-3 Interpersonal subdomain, t(41) = -2.6, p = .014; SRS-2 Total Score, t(41) = 2.5, p = .018; SRS-2 Social Cognition domain t(41) = 2.1, p = .040; SRS-2 Social Communication domain t(41) = 2.1, p = .042; and SRS-2 Restricted Interests and Repetitive Behavior domain t(41) = 2.7, p = .010.

**Conclusions:** Higher anxiety symptoms were significantly related to greater impairment in adaptive daily living and interpersonal relationship skills. Additionally, elevated anxiety symptoms were also significantly related to higher core social impairment. These findings support the idea that anxiety may further impact existing social difficulties, highlighting the need to target and treat anxiety in addition to core symptoms of ASD. Further, participants who scored in the Borderline/Clinically Significant range on the CBCL anxiety subscale had...
significantly lower adaptive skills and social functioning than participants who scored below the threshold. This finding supports the idea that clinically significant anxiety is linked to increased deficits in adaptive and social functioning beyond the core autism symptoms and requires targeted treatment.

416.317 (Poster) Timing and Risk Factors for Depression Among Autistic Children and Adolescents: Key Findings to Inform Depression Prevention Efforts

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**Background:**

Research evidence suggests that autistic people have a uniquely high lifetime prevalence of depression, with recent estimates suggesting rates between 29% and 50%. This rate is three-to-five-times that of the general population. While these concerning findings should inspire depression prevention efforts that focus on autistic people, little is known about the timing and specific risk factors for developing depression within this heterogeneous population. Such information is needed to inform efforts to prevent depression among autistic people.

**Objectives:**

With a goal to inform prevention efforts during childhood and adolescence, we sought to answer the following research questions:

- What are key risk factors of developing depression among autistic children and adolescents?
- As children and adolescents age, how does the prevalence or predicted probability of current depression differ for those with versus without autism?

**Methods:**

We used data collected between June 2020 and January 2021 for the US Census Bureau’s 2020 National Survey of Children’s Health, a nationally representative survey of households with children ages 0-17 years in the United States (n = 42,777; see Table 1 sociodemographic characteristics). To achieve correct weighted population sizes and variances, survey weights were applied. First, we built a best-fit model of predictors for currently having depression within the subpopulation of autistic individuals. Then, with the full dataset, we used logistic regression to estimate the interaction between age and autism status when predicting current depression diagnosis, controlling for other pertinent predictors. Last, to illustrate changes in prevalence rates and predicted probability of current depression across age stratified by autism diagnostic status, we generated a weighted unadjusted plot and a weighted adjusted plot based on the logistic regression model.

**Results:**

Holding the adequacy of the child’s health insurance coverage constant, our best-fit model (McFadden Pseudo-R-squared = 0.402, indicating excellent fit) suggests the following as statistically significant predictors of depression within autistic children and adolescents: female gender, a higher number of adverse childhood experiences, a higher frequency of being bullied in the past year, higher intellectual ability, higher severity of anxiety symptoms, and older age. Full model results including odds ratios and confidence intervals are reported in Table 2.

In a separate logistic regression model predicting current depression incidence among the full weighted sample, we found that while autism (aOR = 2.49; CI = 1.59 to 3.89), age (aOR = 1.34; CI = 1.28 to 1.41), and other relevant covariates significantly predicted currently having depression, a significant interaction exists between autism diagnostic status and age (p < 0.05). The prevalence and predicted probabilities of current depression among those with and without autism are presented in Figures 1 and 2.

**Conclusions:**

Depression prevention efforts targeting the needs of autistic children and adolescents are likely to be most impactful if geared toward those whose identities, life experiences, intellectual abilities, and anxiety symptoms put them at a higher risk for developing depression. Furthermore, compared to the general population, autistic children display depression at an earlier age, with a steady increase through adolescence.

416.318 (Poster) Transdiagnostic Pathways to Understanding Anxiety and Depression in Autistic Adolescents and Adults

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**Background:** Anxiety and depression frequently co-occur among autistic individuals and exceed prevalence rates reported in non-autistic populations. These co-occurring conditions have been linked to poorer employment outcomes and reduced quality of life for autistic adults. Developing our understanding of how anxiety and depression develop and are maintained by examining transdiagnostic factors is essential to creating effective support options. Several transdiagnostic factors have been implicated in the development and maintenance of anxiety and depression in autistic adults, including insomnia, autistic traits, intolerance of uncertainty, sensory sensitivity, and autonomic symptoms. However, to date no work has used a singular model to examine the relationships between all these constructs.

**Objectives:** To explore relationships between transdiagnostic factors, autistic traits, insomnia, anxiety, and depression in sample of autistic adolescents and adults.

**Methods:** Participants were drawn from the Study of Australian School Leavers with Autism (SASLA) and Australian Longitudinal Study of Autistic Adults (ALSAA) baseline surveys. The sample for this study consisted of 183 autistic people aged 15-80 years (55.2% female), with no co-occurring intellectual disability. Using path analysis, we tested four hypothesis driven models examining inter-relationships between intolerance of uncertainty (IU-12), sensory sensitivity (GSQ), autonomic symptoms (COMPASS-31), autistic traits (AQ-short), insomnia (PSQI), anxiety (DSM-GAD), and depression (PHQ-9).

**Results:** For the four models, analyses were initially conducted using a fully saturated model (df=0), where non-significant pathways and paths with coefficients <.10 were removed. Bootstrapping was performed with 1,000 resamples and 95% confidence intervals were determined. Model 1 provided the best fit to the data, explaining 50% of variance in depression, 37% of variance in anxiety, and 29% of variance in insomnia. Autistic traits, intolerance of uncertainty, and insomnia were directly associated with anxiety and indirectly associated with depression through anxiety. Anxiety, insomnia, sensory sensitivity, autonomic arousal, and intolerance of uncertainty were all directly associated with depression; autonomic arousal and sensory sensitivity were also indirectly associated with depression through insomnia.

**Conclusions:** The results highlight that multiple transdiagnostic factors contribute to anxiety and depression symptoms among autistic individuals. These include not only known pathways such as insomnia and intolerance of uncertainty, but also somatic symptoms and sensory sensitivity. The model did not support a direct relationship between intolerance of uncertainty and insomnia, which could indicate that for autistic people cognitive arousal (e.g., intolerance of uncertainty) is not as salient as physiological arousal (e.g., sensory sensitivity and autonomic symptoms) with respect to insomnia. This pattern of results does not align with the non-autistic literature. The data illustrate the need for careful clinical evaluation and individualised support plans for autistic adults presenting with anxiety or depression difficulties. Results highlight the need to not rely on relationships established in non-autistic populations to drive clinical decision making for autistic people.

416.319 (Poster) Discrimination Against Autistic Adults in Kidney Transplantation: Comparing Transplant Rates and Outcomes Among Autistic and Non-Autistic Adults with End-Stage Renal Disease

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Background: Equity in organ transplantation for people with autism and other developmental disabilities is a topic of social discourse in US media and legislation. This topic was highlighted at the 2022 American Medical Association conference and the US Department of Health and Human Services is currently seeking public comments on how to improve equity and reduce disparities in organ transplantation. At the congressional level, a new House bill is under consideration that would prohibit denying access to organ transplants on the basis of disability. This proposed federal legislation has launched the topic of equity in organ transplantation into US mainstream media and social dialogue. However, studies examining disparities in transplant rates and outcomes among autistic adults to inform evidence-based policymaking initiatives are lacking.

**Objectives**: Compare odds of kidney transplantation and transplant-specific outcomes between propensity-score matched groups of adults with end-stage renal disease (ESRD) with and without co-occurring autism.

**Methods**: As all people with ESRD are eligible for Medicare in the US, we performed a retrospective study using 100% Medicare inpatient and outpatient standard analytical files from 2013-2020. Autistic adults were included if they were aged 18 years or older and had at least one encounter with a diagnosis of ESRD. Propensity-score matching was used to identify a comparison group of non-autistic adults with ESRD who were well-balanced with the autistic adult sample based on age, sex, race, and Charlson Comorbidity Index. The matched cohorts consisted of 2074 adults with ESRD (n=1037 autistic adults) and 344 kidney transplant recipients (n=139 autistic adults). Our outcome measures were: (1) evaluation for kidney transplantation, (2) kidney transplantation, (3) peri-operative complications, and (4) 90-
day readmissions. We used logistic regression to compare autistic and non-autistic adults on the odds of each outcome, controlling for sex, age, and Charlson Comorbidity Index.

Results: Table 1 provides the matched cohort characteristics. Relative to matched peers, autistic adults had 39% lower odds of being evaluated for transplantation (OR=0.61; 95%CI=0.50-0.75; p<0.0001). Among those who were evaluated, autistic adults had 29% lower odds of receiving a kidney transplant (OR=0.71; 95%CI=0.51-0.99; p=0.04). Among matched cohorts of kidney transplant recipients, odds of peri-operative complications and 90-day readmissions were similar for autistic and non-autistic adults (all p>0.05).

Conclusions: Using a large, US national cohort of autistic adults with ESRD, we found rates of evaluation and transplantation were lower for autistic adults than non-autistic peers. Yet, among transplant recipients, peri-operative and 90-day outcomes were similar for autistic and non-autistic adults. This study adds to a growing US national discourse around equal access to organ transplantation for people with disabilities. We recognize that organ transplantation is a lifelong care-intensive undertaking and that, like non-autistic peers, some autistic adults may not be strong candidates for transplantation. However, autistic adults deserve (and legally have a right to) equal access to evaluation and full, holistic consideration as to whether they would be good transplant candidates. Ultimately, our results bolster the body of evidence supporting full consideration of autistic adults for kidney transplantation and the urgent need for anti-discrimination initiatives.

416.320  (Poster) United States National Update of Health Condition Prevalence Among Privately-Insured Autistic Adults
A. Longo, D. Radford and B. N. Hand, (1)The Ohio State University, Columbus, OH, (2)Health and Rehabilitation Sciences, The Ohio State University, Columbus, OH

Background: An increasing amount of literature shows autistic adults are more likely to experience many mental and physical health conditions than the general population. Estimates of physical and mental health condition prevalence among autistic adults can help inform healthcare providers, health promotion initiatives, and healthcare policies aiming to better meet autistic adults’ needs. Prior studies on the prevalence of health conditions among autistic adults using healthcare claims data laid important groundwork for the field but used local or regional data from 2008-2015, which may or may not be consistent current United States (US) national prevalence estimates. We will build on this important work by providing updated prevalence estimates using US national data from 2019-2020 to provide a current, comprehensive picture of the health of autistic adults to inform healthcare, health promotion, and policy initiatives.

Objectives: Compare odds of mental and physical health conditions among autistic adults to age and sex-matched peers.

Methods: We analyzed IBM Marketscan data from 2019-2020, containing inpatient and outpatient healthcare claims from privately uninsured people across the US. Autistic adults (n=30,258) were included if they were aged 18-65 years and had one inpatient or two outpatient encounters with an autism diagnosis. We also identified a population comparison (PC) group of age and sex-matched adults without autism diagnoses (n=60,516). We identified mental and physical health conditions from healthcare claims using the Healthcare Cost and Utilization Project Beta Multilevel Clinical Classification Software for ICD-10, which groups codes in healthcare claims into a smaller number of clinically relevant categories. We used logistic regression models to compare autistic and non-autistic adults on the odds of each mental and physical health condition, controlling for sex, age, and rural residence.

Results: Table 1 provides sample characteristics. Autistic adults had significantly greater odds of all physical health conditions except multiple sclerosis, respiratory infections, arthritis, back conditions, and fractures (Table 2). The largest between-group differences in physical health conditions were epilepsy (OR=8.1, 95%CI=7.6-8.8), osteoporosis (OR=2.9, 95%CI=2.2-3.8), and obesity (OR=2.6, 95%CI=2.5-2.7). Autistic adults also had significantly greater odds of all mental health conditions except substance use disorders. The largest between-group differences for mental health conditions were schizophrenia and psychotic disorders (OR=8.5, 95%CI=7.7-9.3), attention deficit disorders (OR=6.6, 95%CI=6.3-6.8), and personality disorders (OR=6.5, 95%CI=5.7-7.4).

Conclusions: Using the largest US-based sample to-date to provide current, comprehensive estimates of health condition prevalence among privately insured autistic adults. To our knowledge, this study is also the first to estimate the prevalence of health conditions among autistic adults using a US national sample. Consistent with prior studies, we found that autistic adults had significantly greater odds of most physical and mental health conditions. These findings alert healthcare providers and policymakers to health conditions most common among autistic adults to improve screening and management of these conditions, inform initiatives to improve access to healthcare, and guide future funding priorities. Ultimately, this work supports prioritization of innovative, comprehensive person-centered healthcare approaches to evaluate and address specific mental and physical healthcare needs of autistic adults.

416.321  (Poster) Mechanisms Underlying Suicidality in Autistic People with Attention Deficit and Hyperactivity Disorder (ADHD): Testing Hypotheses from the Interpersonal Theory of Suicide
R. Moseley, N. J. Gregory', P. Smith', C. Allison', S. A. Cassidy' and S. Baron-Cohen', (1)Department of Psychology, Bournemouth University, Poole, United Kingdom, (2)University of Cambridge, Cambridge, United Kingdom, (3)Autism Research Centre, Department of Psychiatry, University of Cambridge, Cambridge, United Kingdom, (4)School of Psychology, University of Nottingham, Nottingham, UNITED KINGDOM

Results: Table 1 provides the matched cohort characteristics. Relative to matched peers, autistic adults had 39% lower odds of being evaluated for transplantation (OR=0.61; 95%CI=0.50-0.75; p<0.0001). Among those who were evaluated, autistic adults had 29% lower odds of receiving a kidney transplant (OR=0.71; 95%CI=0.51-0.99; p=0.04). Among matched cohorts of kidney transplant recipients, odds of peri-operative complications and 90-day readmissions were similar for autistic and non-autistic adults (all p>0.05).

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416.321  (Poster) Mechanisms Underlying Suicidality in Autistic People with Attention Deficit and Hyperactivity Disorder (ADHD): Testing Hypotheses from the Interpersonal Theory of Suicide
R. Moseley, N. J. Gregory', P. Smith', C. Allison', S. A. Cassidy' and S. Baron-Cohen', (1)Department of Psychology, Bournemouth University, Poole, United Kingdom, (2)University of Cambridge, Cambridge, United Kingdom, (3)Autism Research Centre, Department of Psychiatry, University of Cambridge, Cambridge, United Kingdom, (4)School of Psychology, University of Nottingham, Nottingham, UNITED KINGDOM

Results: Table 1 provides the matched cohort characteristics. Relative to matched peers, autistic adults had 39% lower odds of being evaluated for transplantation (OR=0.61; 95%CI=0.50-0.75; p<0.0001). Among those who were evaluated, autistic adults had 29% lower odds of receiving a kidney transplant (OR=0.71; 95%CI=0.51-0.99; p=0.04). Among matched cohorts of kidney transplant recipients, odds of peri-operative complications and 90-day readmissions were similar for autistic and non-autistic adults (all p>0.05).

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Background:

While suicidality is especially common within the autistic population, certain individuals seem to be at particularly high risk. Autistic people with co-occurring ADHD appear to be one such group, but the reason for their heightened risk is unknown. Over and above identifying risk factors, understanding why they increase suicide risk is important to develop targeted interventions or strategies for support and prevention. Here, two explanatory mechanisms from the interpersonal theory of suicide (ITS) might be especially pertinent. Firstly, autistic people with co-occurring ADHD are at even greater risk of academic underachievement, unemployment, financial distress, and psychiatric illness, all factors associated with two cognitive-affective states, thwarted belongingness and perceived burdensomeness, which evoke suicidal feelings. The ITS suggests that for people to act on suicidal feelings, they must have acquired ‘capability’ for suicide, which occurs when individuals are habituated to pain and to thoughts of death. The model suggests this typically happens through exposure to traumatic (‘painful and provocative’) events, which, through increasing pain tolerance and eroding fear of pain and death, increase suicide risk through their impact on suicide capability. Given the association between hyperactive/impulsive features and violent and/or traumatic life events, autistic people with co-occurring ADHD may be more likely to acquire capability to enact suicidal thoughts.

Objectives:

We examined two causal pathways to explain heightened suicide risk in autistic people with co-occurring ADHD: firstly, through greater likelihood of thwarted belongingness and perceived burdensomeness; and secondly, that hyperactive/impulsive features might particularly increase risk of painful and provocative events, and through these acquired capability for suicide.

Methods:

Autistic adults (n = 314) completed an online survey including measures of four ITS constructs (thwarted belongingness, burdensomeness, painful and provocative events, and acquired capability) and the Connors Adult ADHD Rating Scale. First, we examined associations between co-occurring ADHD, past-year suicide ideation and lifetime suicide attempts via the parallel mediators of thwarted belongingness, burdensomeness, and anxiety and depression. In several models, we then examined hyperactive, impulsive and inattentive features as predictors of exposure to painful and provocative events and subsequent capability for suicide, and examined whether these two variables, sequentially or individually, mediated an association with lifetime suicide attempts.

Results:

ADHD co-occurrence was associated with past-year ideation via greater feelings of depression and burdensomeness, which also mediated its association with more lifetime suicide attempts. Hyperactive and impulsive features were associated with greater exposure to painful and provocative events, through this greater suicide capability, and henceforth more numerous lifetime suicide events. An additional pathway between both feature-types and lifetime suicide attempts was seen via painful and provocative events alone, suggesting that these events increased suicide risk irrespective of their effect on suicide capability.

Conclusions:

These data suggest that elevated suicidality in autistic people with co-occurring ADHD may be partially related to burdensomeness and to acquired suicide capability following exposure to painful and provocative events. However, as we observed a pathway to suicidality associated with painful and provocative events alone, it is likely that there are other mechanisms through which trauma heightens suicide risk.

Non-Suicidal Self-Injury and Its Relation to Suicide in Autistic People: A Test of Acquired Capability for Suicide As a Causal Mechanism

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Background:

Non-suicidal self-injury (NSSI) is more common in autistic than non-autistic people and serves a range of intrapersonal and interpersonal functions; its defining feature is that it occurs in the absence of suicidal intent. While some autistic people perceive their NSSI as a benign or even positive coping strategy, a worrying relationship between NSSI and increased likelihood of future suicide attempts has been observed in both autistic and non-autistic populations. By way of explaining how non-suicidal behaviour might increase future suicide risk, psychological theory suggests that NSSI might confer capability for suicide through means of increasing pain tolerance, eroding fear of pain and death, and mental rehearsal of suicide. From this perspective, more numerous and more painful/graphic forms of NSSI are especially potent with regards to acquiring suicide capability, such that individuals would later be able to act on suicide ideation if it
occurred. This mechanism for explaining the link between NSSI and later suicidal behaviour has not been examined in autistic people; nor do we know whether certain NSSI behaviours might warrant particular concern.

Objectives:

We aimed to explore acquired capability as the mediator of increased suicide risk associated with NSSI in autistic and non-autistic adults, examining moderating effects of diagnosis on these relationships. Second, we explored whether particular forms and characteristics of NSSI might be especially associated with capability and suicide.

Methods:

Autistic and non-autistic adults (n=314, n=312) completed an online survey exploring lifetime suicide attempts, experience with NSSI, and acquired capability for suicide. We explored relationships between lifetime incidence of NSSI and lifetime suicide attempts via three facets of capability (pain tolerance, reduced fear of death, mental rehearsal of suicide). In self-harming participants (224 autistic and 156 non-autistic), we explored whether capability mediated associations between suicide attempts and four NSSI-related predictors: engagement in scratching, cutting and self-hitting as forms of NSSI, and greater number of different NSSI behaviours.

Results:

While higher frequency of NSSI was associated with all three facets of acquired capability in both groups, only reduced fear of death and mental rehearsal of suicide mediated an indirect relationship between NSSI and lifetime suicide attempts. More NSSI also directly predicted more numerous suicide attempts. Autistic people tended towards reduced fear of death and mental suicide rehearsal regardless of NSSI status. Among self-harming autistic and non-autistic participants, cutting and increased number of NSSI behaviours were particularly strongly associated with lifetime suicide attempts, with acquired capability only partially mediating these relationships. Acquired capability did, however, fully explain an association between self-hitting and lifetime suicide attempts in both groups.

Conclusions:

Our data suggest that acquired capability only partly explains the association between NSSI and suicide risk. This relationship (especially pertaining to certain forms of NSSI, like cutting) might be partly explained by a third variable common to both, such as the presence of mental illness. A broader conceptualization of suicide capability, with innate and acquired factors of varying stability, may also offer greater explanatory power as regards understanding relationships between NSSI and other life events and suicidality.

POSTER SESSION — MEDICAL AND PSYCHIATRIC COMORBIDITY

424 - Medical and Psychiatric Comorbidity I

424.246 (Poster) Aggression: Comparisons in Autistic and Neurotypical Youth across Childhood


Background: Approximately half of autistic youth experience issues with aggression. Aggression can exacerbate the problems autistic youth often already experience with peers, and it can be a precipitating factor in inpatient hospitalizations, referral to longer-term residential programs, and expulsion from school. Unfortunately, the prevalence and characterization of aggressive behaviors across development in this population remains poorly understood. Furthermore, the literature infrequently explores similarities or differences in aggression for autistic versus neurotypical youths.

Objectives: The current study attempted to better characterize aggression in autistic youth, building on extant literature in several ways: 1) data was collected from large samples of autistic youth and age-matched neurotypical youth (ages 3-17 years), 2) multiple measures of aggressive behavior and related constructs (i.e., anger, disruptive behavior) were used for a comprehensive assessment of youth functioning, and 3) qualitative descriptions were also collected to understand parental concerns.

Methods: Caregivers of autistic children were recruited from the Simon Foundation’s Powering Autism Research (SPARK) database. Caregivers of neurotypical children were recruited online through a digital software company (i.e., Cint). Families of children (<6, 6-12, 13-17 years) with autism (N = 450) and neurotypical children (N = 432) completed multiple measures of aggressive behavior. Families completing the assessments included mostly mothers (82.2%) who were married (78.0%) with at least a bachelor’s degree (59.6%). Children were largely male (79.0%) averaging 9.70 years; were White, non-Latinx (83.1%) followed by Latinx (16.6%) and then Black (8.6%). Child demographic variables did not differ between groups.
Background:

Anxiety disorders are the most prevalent co-occurring mental health problem in autism spectrum disorder, impacting negatively numerous life domains. Accurately measuring anxiety in autism has proven challenging and fraught with complexities. Despite anxiety symptoms being divided into different anxiety disorders, these are frequently associated, resulting in an individual experiencing symptom from several seemingly distinct diagnostic categories. Moreover, symptoms of anxiety and autism are often difficult to disentangle, and the large heterogeneity in autism symptoms and other individual characteristics, may also affect the presentation of anxiety symptoms. These unresolved complexities, emphasize the need to further study the phenomenology of anxiety symptoms in autism. Network theory has the potential to do just this. According to network theory, interactions between the symptoms themselves is constitutive of the disorder. In network theory, mental disorders are seen as complex dynamic system of interacting symptoms that influence each other, with some individual symptoms playing a unique and central role in relation to other symptoms.

Objectives:

To examine the network structure of anxiety symptoms in a large sample of autistic children and adolescents. Specifically, to investigate the interconnection among anxiety symptoms across various anxiety disorders and to determine which symptoms form distinct communities. Furthermore, to examine whether anxiety symptoms exhibit differential relationships with clinically relevant variables such as autism features.

Methods:

We utilized a large, pooled sample of 1133 of autistic children and adolescents (M age = 11.25 years, SD age = 2.54; 149 females) and analyzed their caregivers’ report on anxiety symptoms using the Spence Children’s Anxiety Scale-Parent Version. We estimated Gaussian Graphical Model network, a regularized partial correlation network model. The graphical lasso was used to ensure estimation of spurious edges. To estimate the structural importance of individual symptoms, we examined node strength centrality (i.e., the number and strength of connections a node has with other nodes), theoretically proposed to denote the importance and clinical relevance of symptom within a network. To identify which symptoms, tend to cluster together we performed community detection analyses using the Louvain algorithm. Last, we carried out state-of-the-art stability and accuracy analyses.
Results:

The anxiety network featured a highly inter-connected structure; all domains correlated but to varying degrees. Figure 1 presents the network structure with symptoms colored according to the communities identified by the Louvain community detection algorithm. Positive edges are found among nodes belonging to the same community as well as among nodes belonging to different communities. Social anxiety and generalized anxiety symptoms were strongly connected and tend to cluster together. Symptoms of generalized anxiety had the highest strength centrality (e.g., worries about things). Results in relation to autism features will also be discussed.

Conclusions:

Findings demonstrate the interconnected nature of anxiety disorders, manifests along multiple, inter-connected symptom domains. Findings revealing high connectivity of generalized anxiety symptoms suggests that worry shared across other more specific domains. Findings attest to the potential value of applying the network approach for a more detailed and nuanced description of the structure of anxiety symptoms in autism.

424.248 (Poster) Anxiety and Depression Mediated the Relationship between Autistic Traits and Eating Disorder Psychopathology

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Background:

Autistic individuals often do not only experience the core symptoms of Autism Spectrum Disorder (ASD; e.g., difficulties in social communication) but also co-occurring mental health issues (e.g., anxiety, depression and eating disorders; Brede et al., 2020; Hollocks et al., 2019). ASD can manifest in individuals in a variety of severity levels (Gotham et al., 2009), representing one end of a continuum. In this continuum, traits associated with ASD are higher in autistic individuals, intermediate in first degree relatives of autistic individuals, and lower in neurotypical individuals (e.g., Wheelwright et al., 2010). These autistic traits are positively associated with symptoms of anxiety, depression and eating disorders in both autistic and non-autistic individuals (e.g., Coombs et al., 2011; Kanne et al. 2009). However, the nature of these associations remains unclear.

Similar to autistic individuals, individuals with Anorexia Nervosa (AN) also often experience co-occurring mental health issues, particularly anxiety and depression (e.g., Riquin et al., 2021). Although this co-occurrence may be explained by neuroendocrinological imbalances induced by starvation, there are evidence suggesting that individuals with AN have pre-existing anxiety and depression (Johnson et al., 2002; for a review, see O’Brien & Vincent, 2003) which could be related to higher autistic traits.

Objectives:

Study 1 studied the relationships between autistic traits, anxiety, depression and eating psychopathology in a non-clinical sample. Study 2 replicated and furthered Study 1 by having a larger sample, using shorter measures as well as controlling for alexithymia which is a difficulty in identifying emotions and another common co-occurrence in ASD and eating disorders (e.g., Kinnaird et al., 2019; Westwood et al., 2017).

Methods:

In Study 1, 178 adults (136 females, 32 males, 10 non-binary; mean age = 27.61, SD = 11.33, age range = 18-64) participated in an online survey measuring depression (the Patient Health Questionnaire; Kroenke & Spitzer, 2002), anxiety (the Beck Anxiety Inventory; Beck et al., 1988), autistic traits (the Autism-Spectrum Quotient; Baron-Cohen et al., 2001) and eating psychopathology (the Eating Attitudes Test; Garner et al., 1982). Four hundred and fifty-four adults (365 females, 66 males, 18 non-binary, 4 prefer not to say; mean age = 23.16, SD = 6.73, age range = 18-72) participated in Study 2 which used the short Depression Anxiety Stress Scales (Henry & Crawford, 2005) for anxiety, the short Autism-Spectrum Quotient (Booth et al., 2013) and the short Eating Disorder Examination Questionnaire (Gideon et al., 2016) instead, plus the short Toronto Alexithymia Scale (Williams & Gotham, 2021) and the Patient Health Questionnaire.

Results:

Results from both studies showed that anxiety and depression mediated the relationship between autistic traits and eating psychopathology. Results in Study 2 further revealed that these were indirect-only mediations while controlling for alexithymia.

Conclusions:
These findings suggested that individuals with higher autistic traits are more likely to experience symptoms of anxiety and depression which in turn increasing the likelihood of experiencing symptoms of eating disorders. However, cautions would need to be made in concluding any causality of these relationships given that the data was cross-sectional.

424.249 (Poster) Anxiety and Depressive Symptoms in Autistic Adolescents and Youths: Investigating Risk and Protective Factors
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Background: Anxiety and depression appear to be among the most common comorbid conditions in children and youths with autism spectrum disorders (ASD) conferring unique impairments in their quality of life (White et al., 2018). Different factors were found to be involved in the regulation (adaptive emotion regulation strategies, social support) and maintenance (maladaptive emotion regulation strategies, worry, rumination) of these psychiatric symptoms in the general population (Scardera et al., 2020; Schäfer et al., 2017; Young & Dietrich, 2015). However, few studies have investigated anxiety and depressive symptoms in autistic adolescents considering different risk and protective factors (Yarger & Redcay, 2020) and none have analyzed together the role of cognitive processes such as worry and rumination, emotion regulation strategies and perceived social support.

Objectives: The aim of the present study was to explore the level of comorbid symptoms of anxiety and depression in autistic adolescents and youths, comparing them with a matched group of non-diagnosed (ND) peers. The role of risk (repetitive negative thoughts, maladaptive emotion regulation strategies) and protective (perceived social support, adaptive emotion regulation strategies) factors contributing to these comorbid anxiety and depression symptoms was also considered.

Methods: A total of 124 Italian adolescents and youths (ASD group with no intellectual disability=41 (35 M); matched ND group = 83 (71 M); aged 13-20 years; mean age=16.75 years, SD=1.69 years; no difference between groups in the Full Scale Intelligence Quotient (F(1, 122)=1.72, p=.19)) were recruited. Self-reports assessing anxiety, depression, repetitive negative thoughts (i.e. worry and rumination), emotion regulation strategies, and perceived social support were administered. First, a series of univariate ANOVA were performed in order to highlight similarities and differences between groups. Second, regression analyses were conducted to investigate the associations among the dependent variables (anxiety and depression) and the hypothesized risk and protective factors.

Results: Higher levels of anxiety $[F(1, 122)=37.69, p<.001]$ and depression $[F(1, 122)=6.56, p=.01]$ were found for the ASD group as compared to the ND group. The significant contribution of similar factors emerged in association to the two groups’ anxiety symptoms: higher levels of worry $[B=-.46, p<.001]$ and maladaptive emotion regulation strategies $[B=.27, p=.04]$ corresponded to higher anxiety, while higher perceived social support $[B=-.27, p=.008]$ corresponded to lower anxiety. Concerning depression, the significant effect of similar risk factors emerged for the two groups (i.e. rumination $[B=.40, p=.02]$ and maladaptive emotion regulation strategies $[B=.36, p=.03]$), while the effect of different protective factors emerged: higher levels of adaptive emotion regulation strategies for the ASD group $[B=.25, p=.05]$ and higher perceived social support for the ND group $[B=.27, p=.03]$ were significantly associated with lower depression.

Conclusions: Overall, our findings showed higher anxiety and depressive symptoms in autistic adolescents and youths as compared to the ND group. The significant role of similar risk factors, in explaining anxiety and depression symptoms of both groups emerged. However, different protective factors seem to contribute to their depressive symptoms, revealing that support different abilities might be relevant to reduce these symptoms in each group. The clinical and preventive implications of these findings are discussed.

424.250 (Poster) Anxiety, Depression, and Well-Being in Autistic Adults: A Longitudinal Cross-Lagged Analysis
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Background: Autistic people are at high likelihood for anxiety and depression, which can negatively affect a host of outcomes. Although we have a growing understanding of internal and external factors that might place an autistic person at greater risk for these mental health concerns, there is limited research on the temporal links between anxiety and depression over time, and how this interplay might impact specific aspects of positive subjective well-being.

Objectives: First, we aimed to better understand the temporal associations between anxious and depressive symptoms in autistic adults by testing cross-lagged models. Second, we sought to understand how and if anxiety and depression explain unique variance in specific dimensions of well-being in autistic adults.

Methods: A sample of 131 autistic adults were drawn from an ongoing longitudinal study at two time points (Time 1 (T1): ages 18 – 26, M = 20.15, SD = 1.68; Time 2 (T2): ages 26 and older, M = 26.67, SD = 1.75). Depressive symptoms were measured at T1 and T2 with the Beck Depression Inventory- II (Beck et al., 1996) and scored using an IRT-based program developed for autistic adults (Williams et al., 2021). Anxious symptoms were measured at T1 and T2 with the Adult Manifest Anxiety Scale (AMAS; Reynolds et al., 2003). Wellbeing was measured at TP2 with the Scales of Psychological Well-Being (SPWB; Ryff, 1989) and included three subscales (purpose in life, self-acceptance, personal growth). All three measures were completed by caregivers in order to include participants of varying ability levels in
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the sample; a subsample \((n = 76)\) also provided self-report. Developmentally appropriate standardized IQ measures indexed cognitive ability and the Autism Diagnostic Observation Schedule Calibrated Severity Score (ADOS-CSS) measured autism features; both IQ and ADOS-CSS were included as covariates in all models. A cross-lagged panel analysis was run with caregiver-reported data, and given the smaller sample size, regressions were utilized with self-report.

**Results:** There were significant autoregressive effects for anxiety symptoms and depressive symptoms based on both caregiver-report (Figure 1) and self-report (Table 1). Based on caregiver-report, anxiety symptoms predicted later depressive symptoms, but depressive symptoms did not predict later anxiety (Figure 1). The opposite pattern was identified for self-report as depressive symptoms predicted later anxiety, but anxiety not predict later depression (Table 1). Anxiety was related to self-acceptance based on both self- and caregiver-report (Figure 1; Table 1). Depression was related to all three dimensions of well-being according to caregiver-report and only related to purpose in life via self-report (Figure 1; Table 1).

**Conclusions:** Results revealed that, although the pattern of findings differed across reporter, there was evidence for cross-lagged links between anxiety and depression over time among autistic adults. Additionally, aspects of positive well-being (purpose in life, self-acceptance, personal growth) demonstrated differential links with anxiety and depression. These findings highlight the potential utility of a transdiagnostic approach to mental health services for autistic adults, and the need to carefully monitor for anxious or depressive symptoms in autistic adults presenting with depression or anxiety, respectively.

424.251  (*Poster*) Assessment of Anxiety and Behavioral Disorders Among Children with Autism Spectrum Disorder and Other Neurodevelopmental Disorders

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**Background:**

There is a strong clinical need for valid and standardized measures of mental health disorders in children and youths with autism spectrum disorder (ASD) and other neurodevelopmental disorders (OND).

**Objectives:**

We here assessed associations between three ASD and OND mental health symptom measures and general child mental health diagnostic interview.

**Methods:**

We included children referred for ASD or OND assessment at a neuro-pediatric outpatient clinic at a university hospital in Norway in February 2020 to June 2021. Ratings on the Developmental Behavior Checklist (DBC-P), the Aberrant Behavior Checklist (ABC), and the Psychopathology in Autism Checklist (PAC) were compared with emotional and behavioral diagnoses derived from the Developmental Well-Being Assessment (DAWBA) diagnostic interview, completed online by parents, teachers and self-report (from age 11).

**Results:**

Participants were 2 to 17 years of age \((M = 8.3, \ SD = 4.1; 87 \text{ boys and 34 girls}; Table 1)\). The majority of children lived with parents (97.3%). More than half of the parents had college or university degrees (63.6%). DAWBA expert raters were blind to ratings on the DBC-P, ABC and PAC. As shown in Table 1, DSM-IV diagnoses included anxiety disorders (20.6%), depression (3.3%) and behavioral disorders (primarily oppositional defiant disorder (ODD; 19%). Correspondence between measures was adequate for: i) DAWBA anxiety disorders and DBC-P anxiety, ii) DAWBA ODD and DBC disruptive and ABC irritability, and good for iii) DAWBA anxiety disorders and PAC anxiety (Table 2).

**Conclusions:**

Although “gold standard” measures for co-occurring mental health disorders in children with ASD and ND are lacking, the current study indicates adequate to good correspondence between measures designed for the ASD/OND population and anxiety and ODD diagnoses.

424.252  (*Poster*) Associations between the Pupillary Light Reflex and Anxiety Symptoms, ADHD Symptoms, and Sensory Behaviors in Autistic Children: Results from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT)
Background: Autistic children exhibit characteristics of autonomic nervous system (ANS) dysfunction including differences in the pupillary light reflex (PLR), the natural constriction and redilation of the pupil in response to light, compared to typically developing (TD) children (Daluwatte et al., 2013). Anxiety, ADHD, and sensory sensitivities, which commonly co-occur with autism, are also related to ANS dysfunction (Daluwatte et al., 2015; Hamrakova et al., 2020; Sharma et al., 2011). Although PLR may serve as an objective index of these shared clinical characteristics, few studies have examined how PLR may differ across autistic children based on these co-occurring clinical features. Work in this area may illuminate physiological mechanisms related to the overlapping presentations of these conditions.

Objectives: This study explored how anxiety symptoms, ADHD symptoms, and sensory behaviors relate to the PLR in autistic children.

Methods: As part of the Autism Biomarkers Consortium for Clinical Trials (ABC-CT), 207 children with autism diagnoses (74% male, 68% white), ages 6-11 (M=8.42±1.65), viewed nine flashes of light on a dark screen during an eye-tracking experiment. PLR was measured at 500 Hz with an SR Eyelink-1000+ binocular remote camera system. Mean constriction time (duration), latency (onset) to constriction, and relative constriction (change in pupil diameter) were calculated. Mean latency was log transformed. One extreme constriction time outlier was removed after conducting Rosner’s test. Parents reported on participants’ autism characteristics using the Social Responsiveness Scale, 2nd edition (SRS-2; Constantino, 2012), ADHD and generalized anxiety symptoms using the Child and Adolescent Symptom Inventory, 5th edition (CASI-5; Gadow & Sprafkin, 2013), and sensory behaviors using the Pervasive Developmental Disorder Behavior Inventory (PDDBI; Cohen & Sudhalter, 1999). Table 1 provides descriptive statistics for scores on these measures. Separate linear regressions explored relationships between each clinical variable and each PLR measure while controlling for ambient light and autism characteristics.

Results: Greater sensory sensitivities (B=−.86, SE=.41, p=.04), generalized anxiety symptoms (B=−.59, SE=.24, p=.02), ADHD hyperactive/impulsive symptoms (B=−.55, SE=.26, p=.03), and ADHD combined symptoms (B=−.66, SE=.30, p=.03) each significantly predicted faster pupil constriction times. The models predicting latency to constriction and relative constriction were not significant (p>.05).

Conclusions: This is the first study to examine the association between pupil constriction time and co-occurring sensory, anxiety, and ADHD symptoms in autistic youth. Faster constriction time was associated with increased symptoms whereas no associations were found with latency to constriction and relative constriction. Results suggest that autistic children with greater ADHD, anxiety, or sensory symptoms may experience greater ANS reactivity than those without these co-occurring symptoms. Given high rates of co-occurring symptoms in autism (Lai et al., 2019), future studies should continue to parse the relationship between these symptoms and PLR in autistic children. Additionally, studies examining PLR differences in autistic children, relative to TD children, should control for co-occurring symptoms. Results highlight PLR constriction time as a tool for understanding neural correlates of individual differences in autism. Future research examining longitudinal relationships between PLR and clinical features may further clarify the utility of PLR as a marker of clinical change.


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Background: Suicidality in Autism Spectrum Disorder (ASD) is a field full of unanswered questions but compelling needs especially in youth. Firstly, specific autism risk and protective factors for suicide ideation and attempt have not been clearly delineated. Secondly, a well-defined clinical picture -unique to autism - predictive of suicide is not known; in addition a distinctive tool for the assessment of suicidality in autism is still lacking. Finally, even if co-occurring disorders have been associated to suicidality (mood disorders, anxiety), enough research attention has not been given to comorbid medical condition such as sleep disturbances.

Objectives:
1. To characterize suicidality (ideation and attempt) and to investigate possible behavioral clinical predictors of suicidality within a population of young individuals with ASD in comparison to a group of peers without diagnosis of ASD.
2. To evaluate if the presence of a sleep disorder and specific sleep parameters (total sleep time, sleep onset latency) are related to suicidality.

**Methods:** Adolescents with an IQ >70 referring to our clinical unit for suspected suicidality from September 2021 to October 2022 were evaluated for the presence of suicide ideation and attempt (The Columbia Suicide Severity Rating Scale C-SSRS), self-cutting (Repetitive Nonsuicidal Self-Injury Questionnaire, R-NSSI-Q), depressive symptoms (CDI2, BDI II), anxiety (MASC2), and social-communicative difficulties (Social Responsiveness Scale SRS). Sleep disorder was evaluated for all individuals using subjective (Sleep Disturbance Scale for Children SDSC) and objective measures (Polysomnography PSG).

**Results:** A preliminary sample of 20 individuals (age M: 15±SD 2.2; IQ 109±17.4) was enrolled: 8 ASD, 12 No-ASD (age t = 0.11 p = 0.90; IQ t = 0.47 p = 0.63). 50% of ASD and 66.7% of No-ASD presented suicide ideation. Suicide attempt was not found within ASD sample. ASD individuals with suicide ideation were characterized by a lower level of autism symptoms (ADOS-2 CSS: 4.6) in comparison to participants without suicide ideation (CSS: 6.79). All participants with suicide ideation presented a severe impairment of social-communication skills measured by SRS. Sleep disorder (according to SDSC cut-offs) was present in 16/20 participants of the total sample and 5/8 ASD. Most of individuals with sleep disorder had suicidal ideation (3/5 ASD; 8/11 No-ASD). PSG revealed that all participants with suicide ideation showed reduced total sleep time in comparison to individuals without suicide ideation (t = 2.3 p = 0.048) and alterations of all the other parameters (prolonged sleep onset latency, reduced sleep efficiency, prolonged after sleep onset, reduced total REM). This sleep pattern, even if no significant, was also found in the ASD subgroup with suicidal ideation (Figure).

**Conclusions:** Given the small sample size, this very preliminary report doesn’t permit to lead to any conclusion on suicidality and autism. Of particular interest, it is the finding that a lower level of autism symptoms and the presence of a reduced total sleep time - suggestive of a sleep disorder - characterizes ASD individuals with suicide ideation. As a whole, our results show that suicide ideation is a promising topic in autism which need to be further investigated.

**Background:** Research suggest that a dual diagnosis of autism spectrum disorder (ASD) and substance use disorder (SUD) is uncommon (Işık et al., 2020; Brugha et al., 2011). On one hand, studies indicates the prevalence of SUD in adults with ASD is as high as 83%, with alcohol abuse/dependence disorder being the most prevalent in adults with ASD (Lugo et al., 2019). On the other hand, when addressing the prevalence of ASD in SUD, only one study has examined this prevalence (see Ståhlberg et al. 2010) in which 14% of individuals with SUD had ASD. Even though it seems that ASD + SUD are infrequent, growing evidence indicates that autistic traits (ATs) are more prevalent for those with a SUD (Stickley et al., 2022). ATs represent problems or peculiarities in the development of social interaction, communication, or the presence of restricted behaviors or interests relative to the severity of symptoms and distribution of traits that by themselves fall short of meeting criteria for a clinical diagnosis of ASD (Constantino et al., 2004; Constantino & Todd, 2003; Lai et al., 2013).

**Objectives:** Our aim was to assess autistic traits/dimensions covered by the Autism Quotient-Short (AQ-S): Imagination, Social Skills, Switching, Numbers and Patterns and Routines in a group of individuals with a diagnosis of SUD, other with ASD, and a non-clinical group to explore whether there is a pattern of behaviors between these groups.

**Methods:** So far 117 participants took part of this study. The control group consisted of 45 participants, the ASD group of 45 and the SUD consisted of 27 participants. We ran a Kruskal-Wallis H-Test as well as a post-hoc test, to study group differences between the groups. As the study of Işık et al. (2020) suggested, we expected to find higher scores on the AQ-S on the dimensions of Imagination and Numbers and Patterns.

**Results:** As expected, our results showed the distributions on the Imagination and Numbers and Patterns dimensions from the ASD and SUD groups differed from the scores of the Control group (X(3) = 47.670, p = .001) and (X(3) = 31.151, p = .001), respectively, in which both ASD and SUD participants scored higher than the Control group. Also, our study shows that the two clinical groups, scored higher with a similar distribution in the Social Skills domain X(3) = 53.144, p = .001.
Conclusions: Throughout this study the two main autistic traits previously identified as problematic in the ASD and SUD groups (Imagination and Numbers and Patterns), continued to display the same pattern in the present study. Nonetheless, this study provides new insights between common ATs between the two clinical groups. As the participants with SUD obtained higher scores associated with difficulties in the Social Skills dimension. This new finding indicates that individuals with SUD have similar difficulties in the same extent as those difficulties reported by individuals with ASD.

424.255  (Poster) Autism Spectrum and Hikikomori
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Background: The ‘Hikikomori’ syndrome (HS) is a form of prolonged and severe social withdrawal or social isolation which continues for more than 6 months. In prior research examining hikikomori, various psychiatric disorders have been suggested to comorbid hikikomori, such as anxiety disorder, Schizophrenia, and autism spectrum disorder (ASD). However, little research has been conducted to elucidate the biopsychosocial basis of hikikomori and ASD.

Objectives: We aimed to clarify the common and different bases of hikikomori (social withdrawal) and ASD

Methods: Recruitment was conducted through the outpatient department of the Developmental Disorder Research Center in Showa University Hospital. Patients were limited to males and age limitation was set to above 18 years old. Recruited patients had been diagnosed as ASD by medical interview, AQ, WAIS-III, and ADOS I or II. Patients were subjected to a structured interview regarding social withdrawal, various psychological tests, and blood tests. Through structured interviews, patients were divided into two groups: the hikikomori group and the non-hikikomori group. Assessment was conducted by T test and Mann Whitney U test.

Results: 46 clinical patients whose living conditions and social withdrawal status were evaluable; 17 cases of ASD clinical patients with co-occurring social withdrawal (hikikomori) and 29 controls of ASD clinical patients without co-occurring social withdrawal. No significant differences were found in age, marital status, final education, or household income, and no clear association with withdrawal was found in WAIS scores and AQ-J. In terms of discrepancy, hikikomori cases had an inverse correlation with higher hikikomori scores. In blood tests, uric acid levels were significantly lower in the hikikomori group (p=0.006). The HQ-25, TACS22, PHQ-9, and TCI140 were significantly higher in the hikikomori group, indicating higher tendency toward withdrawal, social anxiety, depression, and avoidance. The adult sensory profile also showed stronger sensory hypersensitivity and sensory avoidance in the hikikomori group. (p<0.009, p<0.01) Atopic dermatitis was a significant comorbidity for hikikomori cases. (p<0.006) 70% of the patients participating in the study had either a past of hikikomori, or was in the state of hikikomori.

Conclusions: Through this study, we have revealed several possible factors of ASD and cases with hikikomori. ASD itself may be stated to be a possible risk factor of hikikomori. ASD cases with higher sensory sensitivity, discrepancy, lower uric acid levels, coexistence of atopic dermatitis, higher depression level and social phobia showed to be possible risk factors of hikikomori. Although having these characteristics may lead to the withdrawal of social activity, by receiving appropriate support from doctors and regional resources, patients with hikikomori may have a good chance from withdrawing from hikikomori. Furthermore, these results may work as predictive factors for psychiatrists examining ASD patients in the future.

424.256  (Poster) Autistic Children Have Elevated Clinical Symptoms When Compared to Non-Autistic Peers

Background: Autistic people often display comorbidities with other psychological conditions, such as ADHD, depression, and anxiety (Mafevsky et al., 2011; Mannion & Leader, 2013). The Child Behavior Checklist 6-18 (CBCL) is a screening tool that aims to detect underlying clinical symptoms within the age group of 6–18-year-olds, and many have used the CBCL to find a common “autistic profile” when compared to non-autistics (Hoffman et al., 2016; Katsuki et al., 2020). However, published work examining differing profiles within autistic samples is sparse.

Objectives: To compare the overall levels of clinical symptoms of school-age autistic children with non-autistic children and to examine whether there were differing profiles of clinical symptoms within the school-age autistic group.
Methods: The children in this study (aged 6-14 years) either had a high or low likelihood of developing autism based on family history (e.g., presence of autism in an older sibling) and were evaluated for ASD at multiple time-points. Thus, participants make up three groups: high-likelihood for autism and autistic (HL-ASD, \( n = 44 \)), high-likelihood for autism but not autistic (HL-Neg, \( n = 127 \)), and low-likelihood for autism and not autistic (LL-Neg, \( n = 100 \)). Group differences in CBCL \( t \)-scores were evaluated for two domain scores: internalizing and externalizing, and eight syndrome scales: anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behavior, and aggressive behavior. A latent class analysis within the HL-ASD group was used to find differing clinical profiles across all eight syndrome scales based on cut off scores of 65 (i.e., borderline or clinical scores). A four-class solution was selected based on log-likelihood values.

Results: The HL-ASD group had significantly higher \( t \)-scores on both the externalizing and internalizing scales when compared to HL-Neg and LL-Neg groups (Table 1). Additionally, the HL-ASD group had significantly higher rates than the LL-Neg group on all eight syndrome scales. The HL-ASD group had significantly higher \( t \)-scores than the HL-Neg group on all syndrome scales except for the somatic complaints scale. The HL-Neg group had significantly higher rates than the LL-Neg group on the attentional problems syndrome scale. The latent class analysis revealed four distinct profiles within the HL-ASD group (Figure 1). The first class (\( n = 4 \)) displayed elevated (i.e., over 50% of class) rates of anxious/depressed behaviors, social problems, rule-breaking behaviors and attentional problems. The second class (\( n = 12 \)) displayed elevated rates of anxious/depressed behaviors, withdrawn/depressed behaviors, and somatic complaints. The third class (\( n = 23 \)) displayed extremely low rates of borderline-clinical/clinical levels on all syndrome scales. The fourth class (\( n = 5 \)) displayed elevated rates of depressed behaviors, thought problems, attention problems, and aggressive behavior.

Conclusions: The group comparisons revealed significant elevations in clinical symptoms for the HL-ASD group when compared to both the HL-Neg and LL-Neg groups. These results highlight the need to provide school age autistic children with comprehensive mental health support. Further research should be done to examine how clinical profiles can be used to better craft interventions and supports for children with clinical symptoms.

Background: Younger siblings of children with autism spectrum disorder (ASD) display higher rates of negative emotions and lower rates of positive emotions on parent-reported questionnaires. An under-explored area in younger siblings is behavioral and physiological measurement during emotion-eliciting tasks (e.g., bubbles). Because physiological indices of arousal can register differences in early-developing processes, they may be informative for mechanisms underlying emotional development and ASD symptom emergence.

Objectives: To examine behavioral and physiological responses during an emotion-evoking task in infants who are increased likelihood for ASD (younger siblings; IL) and low likelihood for ASD (no family history of ASD; LL). A secondary objective was to explore relationships between behavioural and physiological indices and internalizing and externalizing behaviours.

Methods: Participants: IL (\( n = 125 \)) and LL (\( n = 61 \)) infants assessed at 6, 12, 18, and 24 months of age.

Emotion-evoking Task: Activities designed to elicit positive and negative emotions (bubbles, toy play, toy removal, and negative task phases; Sacrey et al., 2021) to measure (1) percent of time looking at the task object (gaze); (2) behavioral affect, coded for valence and intensity; and (3) heart rate, calculated as a change from baseline.

ASD Symptom Expression: The Autism Diagnostic Observation Schedule 2nd Edition Toddler Module was used to measure ASD symptoms and classify participants into three groups: LL (\( n = 61 \)), IL not classified with ASD (IL non-ASD; \( n = 96 \)), and IL classified with ASD (IL-ASD; \( n = 29 \)) at 24 months.

Internalizing and Externalizing Behaviours: Parents completed the Child Behaviour Checklist 1.5-5 years when their child was 3 years old.

Analytic Approach: A a series of linear mixed models with group (IL-ASD, IL-non-ASD, LL) and age (6, 12, 18) as the independent variables and scores on each phase of the EE-Task for heart rate, affect, and gaze as the dependent variables were run. Relationships between behavioural-physiological indices and internalizing and externalizing \( T \)-scores were also examined.

Results: The IL-ASD group displayed higher levels of negative affect during toy removal (\( p = .008, \ d = .36 \)) and negative tasks (\( p = .013, \ d = .36 \)) compared to the other two groups. Further, the IL-ASD group showed a greater increase in heart rate from baseline during the toy removal (\( p = .005, \ d = .38 \)) and negative tasks (\( p < .001, \ d = .42 \)) compared to the LL group. For the associations with the CBCL, there were no relationships at 6 months, but at 12 months, internalizing and/or externalizing behaviours were associated with heart rate during toy removal and negative tasks, affect during toy removal, and gaze during bubbles, toy play, toy removal, and negative tasks (\( p \)’s < .05). At 18
Background: Autistic adults are often camouflaging, which refers to using (un)conscious strategies to present oneself as neurotypical. Since autistic adults reported camouflaging as a cause of their mental health difficulties, several studies tested whether such a relationship exists. It indeed seems to be the case that camouflaging is associated with mental health difficulties. However, these studies were all cross-sectional and therefore, conclusions about causality cannot yet be drawn.

Objectives: In the present study, we use longitudinal data to investigate whether 1) camouflaging predicts the change in mental health difficulties and whether 2) mental health difficulties predict the change in camouflaging behavior.

Methods: In this preregistered (Aspredicted # 89077) study, 334 autistic adults aged 30 to 86 years filled in the Dutch Camouflaging Autistic Traits Questionnaire (CAT-Q-NL), the Symptom Checklist-90 Revised (SCL-90-R) and the Autism Quotient (AQ) on two timepoints, with a time interval ranging from 1.3 to 3.3 years. Using multilevel models we analyzed whether 1) camouflaging at T1 predicted the change in mental health difficulties between T1 and T2 and whether 2) mental health difficulties at T1 predicted the change in camouflaging behavior between T1 and T2. In all analyses we controlled for age, biological sex, and autism traits at T1.

Results: Preliminary analyses showed that mental health difficulties increased over time (β = 11.99, p = .004). Also, there was a significant interaction between time and camouflaging behavior on T1 (β = -.14, p = .001). The negative β indicates that a higher camouflaging score on T1 predicts a decrease in mental health difficulties.

Furthermore, camouflaging did not significantly change over time (β = .53, p = .747). Also, there was no interaction between time and mental health difficulties on T1 (β = -.01, p = .343). This means that any change in camouflaging did not depend on someone’s mental health difficulties at T1. Before INSAR 2023, we will conduct the final analyses in order to present the definite findings at the conference.

Conclusions: Based on these preliminary analyses, we conclude that 1) mental health difficulties increased over time, 2) for people with higher camouflaging scores, mental health difficulties decreased over time and 3) camouflaging seems to be a stable trait that is not influenced by mental health difficulties. These results suggest that more camouflaging would result in less mental health difficulties, which is in sharp contrast to what was hypothesized based on reports of autistic adults and clinical impressions. Further analyses are necessary to test whether these preliminary conclusions are indeed valid and to gain deeper understanding of these findings.

Conclusions: These results suggest that IL children classified as ASD show differences in affect, gaze, and heart rate during an emotion-evoking task, which are associated with internalizing and externalizing behaviours at age 3. As such, behavioral and physiological reactivity during emotionally-evocative tasks may inform early intervention approaches for infants who show early signs of ASD, with potential implications for understanding mechanisms related to emerging ASD.

Background: The connection between autism spectrum disorder (ASD) and schizophrenia is complicated. Autism spectrum disorder and childhood schizophrenia were once considered the same disorder, but during the 1970s, these conditions were differentiated on the basis of age of onset and symptoms. Clinicians continue to report difficulty with the differential diagnosis of these conditions, partly due to apparent similarities in social communication, negative symptoms, and neurocognitive impairments (Jutla, Foss-Feig, & Veenstra-Vanderweele, 2022). To fill this gap, we present two case studies involving deep clinical phenotyping of individuals with an early diagnostic history of ASD and current symptoms of schizophrenia.

Objectives: This detailed case study series of comorbid schizophrenia and ASD, compared with age-matched individuals with ASD only, aims to characterize the overlapping and distinguishing characteristics of schizophrenia and ASD.

Methods: Participants were two young adults with ASD+schizophrenia and 11 young adults with ASD only; Table 1. Current symptoms of ASD were assessed using the ADOS-2, Module 4 in an online protocol (Eigsti et al., 2022) or in-person (Lord et al., 2012). Early ASD symptoms were assessed via parent interview, with the ADI-R (Lord, Rutter, & Le Couteur, 1994). The Vineland Adaptive Behavior Scales-3 (VABS-3) provided a measure of social and adaptive functioning. Schizophrenia symptoms were assessed with the Structured
Clinical spectrum disorder (ASD) is characterized by difficulties in social communication and interaction as well as repetitive behaviors and/or restricted interests. In addition to these core symptoms, children and adolescents with ASD often exhibit comorbid emotional and behavioral difficulties, which in turn negatively affect socioemotional development and life outcomes (Rosen et al., 2018; Guerrera et al., 2019). While numerous studies have examined factors associated with emotional and behavioral difficulties in ASD, they have predominantly focused on child-level characteristics (see Yarger & Redcay, 2020 for review). Consequently, there is limited understanding of the full range of factors that predict emotional and behavioral difficulties, particularly whether and to what extent parental-level factors are associated with such difficulties.

**Objectives:**

The present study aimed to (1) characterize emotional and behavioral difficulties in children and adolescents with ASD in South Korea and (2) investigate whether and to what extent a parental environmental factor (namely, maternal depressive symptoms) is related with emotional and behavioral difficulties in ASD. We also examined the role of potential moderators such as age, sex, and cognitive ability.

**Methods:**

Data were drawn from 112 children and adolescents diagnosed with ASD and their parents. The mean age of the children was 5.25 years (SD=2.69, Range=2-18). There were 88 boys and 24 girls. Children’s emotional and behavioral difficulties were assessed using the Child Behavior Checklist (CBCL), and three domain scores (Total Problems, Internalizing Problems, and Externalizing Problems) were used. The cutoff score (≥ 60) was used to determine the children with clinically significant or subclinical levels of problem behaviors. Cognitive ability was measured using the FSIQ obtained from the K-Leiter-R, K-WPPSI-IV, K-WISC-IV, or K-WAIS-IV. Mothers’ depressive symptoms were self-reported using the Beck Depression Inventory.

**Results:**

(1) Approximately a half of the ASD children and adolescents (51%) had scores indicating clinically significant or subclinical levels of Total Problems. Regarding Internalizing Problems and Externalizing Problems, respectively, 41% and 36% of the participants had a score indicating borderline to clinical levels.

(2) Maternal depressive symptoms significantly, positively correlated with children’s Total Problems, Internalizing Problems, and Externalizing Problems (rs > .33, ps < .001), suggesting mothers with higher depressive symptoms had children with more emotional and behavioral difficulties (Figure 1). In addition, age significantly, positively correlated with Total Problems and Internalizing Problems (rs > .20, ps < .05), suggesting that older ASD children tended to have more emotional and behavioral problems. FSIQ negatively correlated
with Total Problems, indicating that children with higher IQ tended to have less overall extent of emotional and behavioral difficulties ($r = -0.18, p = .07$). No effects of sex were detected.

Conclusions:

A high proportion of ASD children and adolescents showed borderline or clinically significant levels of emotional and behavioral difficulties, suggesting the importance of routine screening and support services for this population. Mothers' depressive symptoms, as well as child age and IQ, were related to emotional and behavioral problems in ASD, indicating that the multiple levels of analysis at child- and parent-levels are needed to understand psychiatric comorbidity in ASD.

424.261 (Poster) Characterization and Association of Temperament Subgroups with Social-Emotional Functioning across the Early Developmental Period

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Background: Links between temperament and social–emotional difficulties are well-established in the general population but remain poorly characterized in autism, particularly during early development when autism and co-occurring symptoms first emerge. Extant studies of autism provide evidence that individual traits predict variability in concurrent internalizing and externalizing symptoms in middle childhood, and the emergence of mental health conditions in later life. However, because multiple temperament traits act in concert and influence on another, a person-centred approach to the study of temperament and its influence could be more informative. This approach conceptualizes temperament as the combination of multiple traits within each person, as opposed to individual traits, and seeks to identify homogeneous subgroups within a heterogeneous population with distinct multi-trait profiles.

Objectives: To characterize temperament subgroups and their association with social-emotional difficulties across the infant and toddler periods.

Methods: 103 infants (68% male) showing signs of emerging autism were referred to the study by community healthcare professionals and seen for assessments when aged around 12-months (Time 1), 18-months (Time 2), and 24-months (Time 3). Latent profile analysis was applied at each timepoint to caregiver-report data on the Infant Behavior Questionnaire-Revised (IBQ-R; Time 1) and Early Childhood Behavior Questionnaire (ECBQ; Times 2 and 3). Next, analysis of variance were performed at each timepoint to explore subgroup differences in concurrent internalizing and externalizing symptoms on the caregiver-reported Infant-Toddler Social and Emotional Assessment (ITSEA), while controlling for autism level on the Autism Diagnostic Observation Schedule-2nd Edition. Validation of subgrouping results was established through examination of (i) the replicability of subgroup configurational structures across timepoints, (ii) the intra-individual consistency of subgroup classification across adjacent timepoints, and (iii) consistency of subgroup associations with internalizing and externalizing symptoms over time.

Results: Subgroups labelled inhibited/low positive, active/negative reactive, and sociable/well-regulated were identified at each timepoint, and an additional reactive/regulated subgroup was identified uniquely at Time 3. Inhibited/low positive and active/negative reactive children had the highest reported internalizing and/or externalizing symptoms at each timepoint, whereas sociable/well-regulated children had the lowest reported symptoms. Subgroups did not differ in terms of child age, sex, or cognitive/developmental level. There was a significant likelihood of children having a recurrent subgroup classification from one timepoint to the next, and no apparent patterns to the movement of children who did change from one subgroup to another over time.

Conclusions: Young children with signs of emerging autism can be divided into temperament subgroups – characterized by varying configurations of multiple traits – that meaningfully map onto variation in internalizing and externalizing symptoms. Temperament subgroup classifications might represent a reliable and very early indicator of social-emotional functioning in the context of emerging autism.

424.262 (Poster) Child Cognition As a Moderator of the Relation between ASD Severity and Anxiety Symptoms

**Background:** Previous research suggests that children with autism spectrum disorder (ASD) receive significantly higher ratings anxiety than non-ASD children (e.g., van Steensel et al., 2011). Studies examining anxiety among youth with ASD have identified autism severity and verbal IQ as predictors (Mayes et al., 2011). However, little research exists on how these three variables relate to one another. For example, some have found that high intelligence is not related to anxiety (Eussen et al., 2012), whereas others propose that it predicts anxiety (Mayes et al., 2011).

**Objectives:** The present study aims to better understand the relation between ASD severity and anxiety by examining demographic variables and parent-rated cognition of the child to bolster evidence of the nature of the relation.

**Methods:** Participants were 115 caregivers with one child with ASD. Caregivers completed questionnaires measuring child anxiety symptoms (BASC-3), ASD severity (CSBQ), and overall cognitive functioning (using a 5-point Likert scale ranging from ‘Well Below Average’ to ‘Well Above Average’).

**Results:** Correlations between demographic variables (child gender, age, and ethnicity) and the variables of interest showed that child age significantly, positively related to ASD symptoms and anxiety symptoms, \( r = .20, p = .01 \) and \( r = .22, p = .02 \), respectively, indicating that older children had higher ratings of both ASD symptoms and anxiety symptoms. Therefore, child age was used as a covariate. There also was a significant positive correlation between ASD severity and anxiety symptoms, \( r = .38, p < .001 \), indicating children with higher levels of ASD symptoms had higher ratings of anxiety.

A moderated multiple regression analysis (Table 1) with age (covariate), ASD severity (predictor), and parent-rated cognition (moderator) predicting anxiety symptoms (criterion) demonstrated that age was a significant predictor in the covariate model (\( p = .02 \)) and that child age and ASD severity were significant predictors in the main effects model (\( p = .02 \) and \( p < .001 \), respectively). Although the cognition main effect was not significant (\( p = .36 \), the interaction between ASD severity and cognition in the final model predicted unique variance in anxiety symptoms (\( p = .04 \)). A post-hoc plot (Figure 1) demonstrated that higher levels of cognition exacerbated the relation between ASD severity and anxiety (\( p < .001 \)), whereas lower cognition attenuated the relation (\( p = .08 \)).

**Conclusions:** Findings suggest elevated social difficulties, in combination with high intellect, put youth at higher risk for anxiety symptoms. They may be more cognizant of their social differences (thereby exacerbating anxiety), whereas those with lower cognitive functioning may be less aware of their social challenges (thereby attenuating anxiety). Some studies have found that anxiety tends to be higher among youth with higher ASD severity (e.g., Baribeau et al., 2020; Mayes et al., 2011; Ozsizadjian et al., 2014), whereas others have found the inverse relation (e.g., Eussen et al., 2012; Gadow et al., 2005), suggesting other factors may moderate this relation. Future studies considering how factors, like cognition, relate to ASD severity and anxiety may further elucidate the nature of the relationship.

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**Background:** Many of the clinical symptoms of autism spectrum disorder (ASD) such as orthostatic dysregulation, bowel movement disorder, and circadian rhythm disorder suggest autonomic nerve disorders. Although autonomic nerve function in children with ASD has been assessed using a variety of methods, a unified view has yet not been reached.

**Objectives:** This study aimed to characterize autonomic nerve function in children with ASD.

**Methods:** Children without congenital heart disease or arrhythmia, who belonged to a regular class without special support for studying, were evaluated for autonomic function using 24-hour electrocardiography (ECG). High frequency power (HF) as an index of parasympathetic function, low frequency power (LF) / HF as an index of sympathetic function, and standard deviation (SD) of each as an index of their respective variability were calculated. Indexes of autonomic nerve function were calculated for two time periods: all day (24 h) and during sleep (1-3 am). They were also assessed for developmental characteristics using the Social Responsiveness Scale Second Edition (SRS-2) and Autism-Spectrum Quotient Test for child (AQ child). We examined the correlation between the index of autonomic nerve function calculated by 24-h ECG and strength of developmental disorder characteristics.

**Results:** Seventeen children (Male 6, Female 11; median age, 10.0) were analyzed. Their median T score and interquartile range (IQR) of total SRS-2, SRS-2 social communication impairment (SCI), SRS-2 repetitive/restrictive behavior (RRB), and total score of AQ child were as follow: 63.4 (IQR 53-76), 62.0 (IQR 53-73), 61.4 (IQR 48-70), and 25.6 (18-31), respectively. In the indexes of autonomic nerve function, only SD of LF/HF during sleep (1-3 am) were significantly correlated with T score of total SRS-2 (\( p=0.016, r=0.574 \)), T score of SRS-2 SCI (\( p=0.018, r=0.567 \)), total score of AQ child (\( p=0.025, r=0.540 \)).

**Conclusions:** Although difference in overall autonomic nerve function was absent, it can be concluded that the stronger the ASD characteristics, the stronger the variability of sympathetic fluctuation during sleep.
Background: The exact mechanisms and clinical characteristics of comorbid tic disorders in individuals with ASD remain unclear.

Objectives: The primary aim of this study is to investigate the prevalence of comorbid tic disorders in individuals with ASD using standardized assessment methods. Secondly, we aimed to explore differences in ASD symptom severity, other comorbidities, such as OCD symptoms and externalizing/internalizing behaviors, and baseline functioning through verbal/non-verbal IQ or adaptive behaviors.

Methods: We included individuals diagnosed with ASD (n = 679) aged 4 to 18 years who completed the Yale Global Tic Severity Scale (YGtSS) questionnaire. Based on the YGtSS score, the included individuals were divided into two groups: ASD only (n = 554) and ASD with tics (n = 125). Individuals were assessed using the verbal and non-verbal intelligence quotient (IQ), Vineland Adaptive Behavior Scale (VABS-2), Social Responsiveness Scale-2 (SRS-2), Child Behavior Checklists for Ages 6-18 (CBCL), and Yale-Brown Obsessive-Compulsive Scale (YBOCS), followed by between-group comparisons. All tests were conducted using the Statistical Package for the Social Sciences (SPSS) version 26.

Results: Regarding the type of tics, both motor and vocal tics affected the majority of individuals (n = 40, 40.0%). The ASD with tics group had a significantly higher average age and full-scale IQ score than the ASD only group. Regarding clinical characteristics, the ASD with tics group showed significantly higher SRS-2, CBCL, and YBOCS subdomain scores after adjusting for age. Furthermore, all variables except the non-verbal IQ and VABS-2 scores were positively correlated with the YGtSS total score. Individuals with a higher IQ (IQ ≥70) showed a significantly greater proportion of tic symptoms.

Conclusions: A higher IQ is associated with a greater proportion of tic symptoms in individuals with ASD. Moreover, the severity of ASD core and comorbid symptoms is associated with tic disorders and tic severity among affected individuals. Accordingly, there is a need for proper surveillance and clinical interventions for individuals with ASD.

Background: Autism spectrum disorder (ASD) with co-occurring sensorineural hearing loss is established (Beers et al., 2014). However, only one report of ASD co-occurring with auditory neuropathy spectrum disorder has been reported (ANSD; Plyer et al., 2005). ANSD is a disorder with abnormal/absent neural responses—auditory brainstem response (ABR) and presence of pre-neural responses—otoacoustic emissions (OAEs) or cochlear microphonics (Starr et al, 1996). This creates challenges in auditory processing, speech discrimination and delayed language development (Breneman et al., 2012).

Objectives: The primary aim of this study is to investigate the prevalence of comorbid tic disorders in individuals with ASD using standardized assessment methods. Secondly, we aimed to explore differences in ASD symptom severity, other comorbidities, such as OCD symptoms and externalizing/internalizing behaviors, and baseline functioning through verbal/non-verbal IQ or adaptive behaviors.

Methods: This case report is of a 40-month-old, male child presenting with concerns of inconsistent response to name call, soft and loud sounds, atypical and reduced communication, and poor social interaction. A multidisciplinary team (MDT) of audiologists, speech-language pathologists, and a child psychiatrist assessed the child. Audiological evaluation consisted of immittance audiometry, distortion product OAEs (DPOAEs), and ABR. Detailed history was collected from parents and assessments were conducted over four sessions. Developmental and behavioural assessments (e.g., ComDEALL Developmental Checklist, CSBS-DP) were conducted using parent report and direct observation measures. Although diagnostic measures like ADOS-2 could not be administered due to prohibitive costs for training in LMICs, a 30-minute semi-structured play session with a clinician was video recorded and coded for behaviours under domains of social communication, play skills and Restricted Repetitive Behaviours (RRBs). A clinical best estimate (CBE) diagnosis was made using DSM 5.

Results: Audiological evaluation revealed normal middle ear function, bilateral absent reflexes and bilateral DPOAEs present (Fig 1a) indicative of normal outer-hair cell functioning. ABR revealed bilateral absent peaks at 90 dB nHL and clear pattern of cochlear microphonics (Fig 1b). These results confirmed bilateral ANSD. The child demonstrated delay across multiple domains (Fig 2) with larger delays in communication, social, and cognition domains. Play session observations included reduced use of gestures, poor joint attention and verbal/nonverbal imitation, limited social overtures, poor social engagement and sharing of interests, atypical nonverbal communication, challenges in transitions, presence of repetitive play and restricted interests (e.g., banging of objects, vocal stimulating, hand flapping) – patterns not seen in ANSD. Infact, non-verbal communication and imitation are strengths for children with ANSD (Stredler-
Brown, 2002). Further probing of RRB’s indicated presence of behaviours like adherence to play routine, preference to certain food consistencies, challenges with haircutting and nail clipping, and increased threshold of pain – profiles not commonly seen in ANSD. Based on clinical history, parent interview and observation, a CBE diagnosis of ASD was made.

Conclusions: Reduced gesture use, atypical non-verbal communication, poor joint attention, and imitation were amongst the most important clinical features that prompted us to look for concerns beyond ANSD. Detailed history, good clinical observations, and an eye for differential diagnosis by an MDT is crucial for distinguishing and reporting co-occurring diagnoses such as these. Early identification and diagnosis of such comorbid disorders can guide tailored interventions focusing on providing amplification devices, auditory training, promoting multimodal communication, enhancing social-communication, reciprocity, and engagement with appropriate family support.

424.266 (Poster) Cognitive Disengagement Syndrome in Young Autistic Children with and without Co-Occurring ADHD: Clinical and Neurobiological Correlates


Background: Cognitive Disengagement Syndrome (CDS; previously called Sluggish Cognitive Tempo), refers to a constellation of cognitive and motor behaviors characterized by a propensity for mind wandering and slowness in behavior. CDS has predominantly been studied in individuals with Attention-Deficit/Hyperactivity Disorder (ADHD) and is associated with greater social difficulties, more internalizing symptoms, different sensory responses, and increased academic difficulties. CDS is estimated to occur in 30-49% of autistic individuals, yet less is known about its clinical presentation or neurobiological correlates, particularly in young autistic children. However, early evidence suggests that CDS is associated with similar difficulties when co-occurring with autism as when co-occurring with ADHD.

Objectives: Explore the clinical and neurobiological correlates of CDS in autistic children with and without co-occurring ADHD and children with only ADHD.

Methods: Participants were 196 3-8 year old children from three groups: Autistic (N=55), Autistic+ADHD (N=46), ADHD (N=51), and neurotypical (N=44). CDS was assessed with 8 questions from the Child and Adolescent Disruptive Behavior Inventory. Social skills, sensory processing, and internalizing symptoms were assessed via parent report using the Social Responsiveness Scale, Sensory Experiences Questionnaire, and Child Behavior Checklist, respectively. Neurobiological correlates were assessed using resting state EEG (rsEEG) in 138 participants (DVs: absolute theta [4-8Hz], absolute beta [16-30Hz], and theta/beta ratio at frontal-central channels). Associations between CDS and clinical and neurobiological outcomes were tested across the three clinical groups using general linear models with age, sex, and developmental quotient included as covariates.

Results: While all three clinical groups had significantly elevated CDS scores compared to neurotypical children, CDS scores were similar among Autistic, ADHD, and Autistic+ADHD children. Autistic and Autistic+ADHD children had greater social difficulties (F(1)=40.2, p<.0001) and sensory hypersensitivity (F(1)=3.0, P=.05) compared to children with ADHD alone. However, regardless of diagnostic classification, higher CDS scores were associated with greater social difficulties (F(1)=12.8, p<.0001) and hypersensitivity (F(1)=29.4, p<.0001) across groups. Higher CDS score were also associated with greater sensory hypersensitivity (F(1)=40.4, p<.0001) and greater internalizing symptoms (F(1)=30.3, p=.0001) for all groups. Analyses of EEG revealed that rsEEG theta absolute power (F(1)=8.5, p<.01) and group (F(2)=3.8, p<.05) individually predicted higher CDS scores. Furthermore, there was a significant group-by-theta interaction (F(2)=3.3, p<.05); lower frontal-central rsEEG theta power was associated with higher CDS scores for the Autistic+ADHD group (F(1)=11.6, p<.01) but not other groups. There were no significant associations between CDS score and either rsEEG beta power or theta/beta ratio.

Conclusions: Our results revealed similar elevated CDS scores for children diagnosed with autism, ADHD, and autism+ADHD. Furthermore, higher CDS scores were associated with greater social difficulties, internalizing symptoms, and sensory differences regardless of diagnostic group. Lower rsEEG frontal-central theta power was associated with higher CDS scores for young Autistic+ADHD children, but not children with either disorder alone. Some previous evidence suggests theta power may be increased in autistic and ADHD children, but decreased in children with co-occurring autism+ADHD. As such, associations between decreased theta and higher CDS in our Autistic+ADHD group suggests that elevated CDS may explain, in part, prior findings of decreased theta in autism+ADHD.

424.267 (Poster) Comprehension of Death and Suicide in Youth with Autism and Other Neurodevelopmental Disorders

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Conclusions: Reduced gesture use, atypical non-verbal communication, poor joint attention, and imitation were amongst the most important clinical features that prompted us to look for concerns beyond ANSD. Detailed history, good clinical observations, and an eye for differential diagnosis by an MDT is crucial for distinguishing and reporting co-occurring diagnoses such as these. Early identification and diagnosis of such comorbid disorders can guide tailored interventions focusing on providing amplification devices, auditory training, promoting multimodal communication, enhancing social-communication, reciprocity, and engagement with appropriate family support.

424.266 (Poster) Cognitive Disengagement Syndrome in Young Autistic Children with and without Co-Occurring ADHD: Clinical and Neurobiological Correlates


Background: Cognitive Disengagement Syndrome (CDS; previously called Sluggish Cognitive Tempo), refers to a constellation of cognitive and motor behaviors characterized by a propensity for mind wandering and slowness in behavior. CDS has predominantly been studied in individuals with Attention-Deficit/Hyperactivity Disorder (ADHD) and is associated with greater social difficulties, more internalizing symptoms, different sensory responses, and increased academic difficulties. CDS is estimated to occur in 30-49% of autistic individuals, yet less is known about its clinical presentation or neurobiological correlates, particularly in young autistic children. However, early evidence suggests that CDS is associated with similar difficulties when co-occurring with autism as when co-occurring with ADHD.

Objectives: Explore the clinical and neurobiological correlates of CDS in autistic children with and without co-occurring ADHD and children with only ADHD.

Methods: Participants were 196 3-8 year old children from three groups: Autistic (N=55), Autistic+ADHD (N=46), ADHD (N=51), and neurotypical (N=44). CDS was assessed with 8 questions from the Child and Adolescent Disruptive Behavior Inventory. Social skills, sensory processing, and internalizing symptoms were assessed via parent report using the Social Responsiveness Scale, Sensory Experiences Questionnaire, and Child Behavior Checklist, respectively. Neurobiological correlates were assessed using resting state EEG (rsEEG) in 138 participants (DVs: absolute theta [4-8Hz], absolute beta [16-30Hz], and theta/beta ratio at frontal-central channels). Associations between CDS and clinical and neurobiological outcomes were tested across the three clinical groups using general linear models with age, sex, and developmental quotient included as covariates.

Results: While all three clinical groups had significantly elevated CDS scores compared to neurotypical children, CDS scores were similar among Autistic, ADHD, and Autistic+ADHD children. Autistic and Autistic+ADHD children had greater social difficulties (F(1)=40.2, p<.0001) and sensory hypersensitivity (F(1)=3.0, P=.05) compared to children with ADHD alone. However, regardless of diagnostic classification, higher CDS scores were associated with greater social difficulties (F(1)=12.8, p<.0001) and hypersensitivity (F(1)=29.4, p<.0001) across groups. Higher CDS score were also associated with greater sensory hypersensitivity (F(1)=40.4, p<.0001) and greater internalizing symptoms (F(1)=30.3, p=.0001) for all groups. Analyses of EEG revealed that rsEEG theta absolute power (F(1)=8.5, p<.01) and group (F(2)=3.8, p<.05) individually predicted higher CDS scores. Furthermore, there was a significant group-by-theta interaction (F(2)=3.3, p<.05); lower frontal-central rsEEG theta power was associated with higher CDS scores for the Autistic+ADHD group (F(1)=11.6, p<.01) but not other groups. There were no significant associations between CDS score and either rsEEG beta power or theta/beta ratio.

Conclusions: Our results revealed similar elevated CDS scores for children diagnosed with autism, ADHD, and autism+ADHD. Furthermore, higher CDS scores were associated with greater social difficulties, internalizing symptoms, and sensory differences regardless of diagnostic group. Lower rsEEG frontal-central theta power was associated with higher CDS scores for young Autistic+ADHD children, but not children with either disorder alone. Some previous evidence suggests theta power may be increased in autistic and ADHD children, but decreased in children with co-occurring autism+ADHD. As such, associations between decreased theta and higher CDS in our Autistic+ADHD group suggests that elevated CDS may explain, in part, prior findings of decreased theta in autism+ADHD.
Background: Youth with autism and other neurodevelopmental disorders (ASD/NDD) are at greater risk for dying by suicide. Suicide risk screening is an early detection strategy aimed at prevention. The age in which children understand death and its finality vary depending on age and developmental trajectory. There is limited research describing how youth with NDD conceptualize and understand death compared with neurotypical peers. As clinicians screen youth with NDD for suicide risk, it is important to evaluate their understanding of suicide and its finality.

Objectives: To describe the relationship between understanding death and suicide risk among youth with ASD and NDD more broadly.

Methods: Children with either ASD or other NDD aged 8-17 years, English-speaking, and verbally fluent were recruited for participation in an ongoing suicide risk screening instrument validation study across 4 medical clinics. Research staff administered an understanding death assessment developed for youth with ASD/NDD (e.g., “If you died, would you wake up the next day?”) along with measures of suicide risk (including the Ask Suicide-Screening Questions [ASQ], a brief 4-item validated tool as well as 10 candidate items developed specifically for ASD/NDD youth). The data collector and each participant’s parent/guardian also evaluated the participant’s perceived level of understanding. Response categories included: “completely understood,” “somewhat understood,” and “did not understand.” Parent and child acceptability of suicide risk screening are also reported.

Results: Of 269 eligible participants to date, 57.0% (n=153) children were enrolled and screened (73.9% male, 56.2% White, 33.3% Black, mean age: 12.4 [SD 2.6]). Approximately one-fifth, 20.3% (n=31), of participants screened positive on the ASQ. 84.3% (n=129) of all participants reported having heard the word “suicide” previously though responses of its definition were mixed, and 9.8% (n=15) reported knowing someone who died by suicide. 90.1% (n=138) of participants understood the finality of death (i.e., indicating that those who die do not wake up the next day). The majority of both youth (63.7%, n=86/135) and parents/guardians (85.2%, n=115/135) indicated children should be screened for suicide risk in the medical setting. Further statistics describing how participants’ understanding of death and suicide differed by ASQ outcome, mental health diagnosis, and age will be presented.

Conclusions: As suicide continues to be a pressing public health problem for youth with ASD and other NDD, evaluating their understanding of death and suicide can inform prevention strategies. Nearly one out of ten youth with NDD in this sample did not understand the finality of death, underscoring the need to tailor prevention strategies to accommodate youth with NDD.


424.268 (Poster) Coping with COVID-19: Neurodivergent Mental Health Differences of Young Adults in the Wake of a Pandemic

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Background: Neurodivergent individuals, including those on the autism spectrum (ASD) or with attention-deficit/hyperactivity disorder (ADHD), often experience higher rates of co-occurring mental health disorders than neurotypical peers (Pehlivanidis et al., 2020), a trend which some studies show has been exacerbated since the pandemic (Oomen et al., 2021; Sibley et al., 2021). Although research on both autistic and ADHD populations during COVID-19 show common themes (e.g., social isolation), there appears to be population-specific impacts too (e.g., chronic boredom in ADHD; stress from routine disruption in autism). Yet, other research indicates the pandemic has also had positive impacts for neurodivergent individuals (e.g., increased time to complete schoolwork for those with ADHD; reduced sensory overload for autistic individuals; Mumbardó-Adam et al., 2021; Oomen et al., 2021; Behrmann et al., 2022). Given mixed findings, it is important to further clarify impacts of the COVID-19 pandemic on neurodivergent populations. Further, few studies have compared impact across neurodivergent groups or among individuals with co-occurring presentations (e.g., ADHD and autism), who generally show greater impairments and needs (Zablotsky et al., 2020).

Objectives: This study explores differences in mental health symptoms of adults on the autism spectrum and/or with ADHD prior to and during COVID.
Methods: Participants included 164 young adults (72.6% male; $M_{age}=22.1$, $SD=4.5$) previously diagnosed with ASD ($n=94$), ADHD ($n=33$), or ASD+ADHD ($n=37$) who presented for treatment at the UCLA PEERS® Clinic prior to COVID (2017-2019; $n=70$) and during COVID (2020-2022; $n=94$). Depression and loneliness were assessed via self-report on the Major Depressive Inventory (MDI; Bech et al., 2001) and Social and Emotional Loneliness Scale for Adults (SELSA; DiTommaso & Spinner, 1993), respectively. Social anxiety was assessed using caregiver- and self-report on the Social Anxiety Scale (SAS; La Greca, 1988).

Results: A MANOVA revealed a significant interaction between diagnosis and COVID presence, $F(8, 252)=2.02$, $p=.045$, suggesting COVID impacted mental health symptomatology differently across neurodivergent groups. Probing this through univariate ANOVAs, the models including depression and social anxiety were nonsignificant. However, a significant interaction emerged in the model including loneliness, as measured by the SELSA, $F(2,139)=5.33$, $p=.006$. Specifically, the ADHD group demonstrated significant increases in loneliness during COVID, $t(26)=-2.77$, $p=.010$, while there were no significant changes in loneliness in the ASD, $t(82)=1.05$, $p=.296$, or ASD+ADHD, $t(31)=-.90$, $p=.378$, groups after the onset of the pandemic. Although autistic adults had significantly higher levels of loneliness pre-pandemic than adults with ADHD, $p=.005$, these differences diminished during COVID due to increased loneliness in adults with ADHD, $p=.452$.

Conclusions: These findings demonstrate similar degrees of depression and social anxiety prior to and during COVID for young adults across neurodivergent diagnostic groups. However, results suggest that the pandemic disproportionately impacted adults diagnosed with ADHD without co-occurring autism with respect to loneliness. Co-occurring autism may have mitigated feelings of loneliness during the pandemic for those with both diagnoses, perhaps due to simultaneous feelings of relief from social stress reported by autistic people (Mumbardó-Adam et al., 2021). Further research investigating the evolution of mental health functioning over time in the COVID-19 pandemic is also warranted.

424.269  (Poster) Depression and Anxiety in Girls with and without Autism Spectrum Disorder, Considering Pubertal Timing
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Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by social communicative impairments and sensory sensitivities. In addition, the physical and social changes that occur with puberty may be a turbulent time for adolescents. Earlier pubertal timing has been correlated with higher internalizing mental health symptoms for neurotypical girls. Specifically, earlier onset of menarche in females has been tied to higher rates of depression that persist into adulthood (Hoyt, 2020). Less longitudinal research has been done on the effects of differential pubertal timing on autistic girls, with one study demonstrating early onset of puberty for only females (Corbett, 2020) and another study finding no early puberty onset (May, 2017).

Objectives: To investigate the relation between pubertal timing and internalizing mental health problems for both autistic and non-autistic adolescents in a longitudinal study.

Methods: 23 female ASD participants (ages 8 to 17 at the 1st time point) and 42 female TD participants (ages 8 to 17 at the 1st time point) from the ACE GENDAAR network, a five-site NIH-funded project investigating sex and gender differences in individuals with autism, will be included in the study. Participant data was collected at two time points 3 to 8 years apart. ASD diagnosis was confirmed via gold-standard diagnostic measures. Data on pubertal development was collected using the Pubertal Development Scale, a parent or self-report measure of physical development. Depression and anxiety were assessed via the Child Behavior Checklist (CBCL) at the first time point, a parent-report behavioral checklist of comorbid mental health symptoms, and via the Adult-Self Report (ASR) or the Youth Self-Report (YSR), self-report analogues to the CBCL, at the second time point.

Results: Residuals of a pubertal maturation by time regression were calculated for each participant to approximate pubertal timing variation. For both the autistic and the non-autistic group, no significant correlations ($r = -0.292$ to $0.111$) were found between pubertal timing and depression and anxiety data at both timepoints.

Conclusions: Initial correlations have not shown that pubertal maturity at younger ages is related to variability in mental health problems. Future analyses will include a multiple regression model to examine longitudinal effects considering symptoms at and pubertal timing at the first timepoint predicting depression and anxiety at the second timepoint.

424.270  (Poster) Diagnosis of Autism Spectrum Disorder in Donnai-Barrow Syndrome: A Case Study
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Background: Donnai-Barrow syndrome (DBS) is a rare autosomal recessive condition caused by LRP2 gene mutation. The prevalence reported is <1/100,000. DBS is characterized by multiple atypical craniofacial features, ophthalmologic abnormalities, corpus callosum agenesis, sensorineural hearing loss, intellectual disability, and global developmental delay (GDD) (Longoni., et al, 2018). Autism spectrum disorder (ASD) diagnosis in DBS is even rarer and has not been reported previously.

Objectives: To highlight the process of ASD diagnosis in a child with DBS

Methods: This case report is of a 6-year-old female child, diagnosed with DBS confirmed by genetic testing at birth. The child was fitted with cochlear implants bilaterally at 13 months of age and has been attending auditory-verbal therapy (AVT) since then. Her ocular difficulties (myopia) were corrected using prescription spectacles. Parental concerns of limited improvement in language and social communication, reduced social interaction and poor outcomes with AVT suggested a need for detailed assessments to rule out presence of other neuro developmental disorders. Although parents were concerned earlier (by 4 years), they had not brought her for an evaluation due to the pandemic. A team of speech language pathologists, child psychologist and psychiatrist assessed the child. Detailed history was collected from parents following which formal behavioural and developmental assessments (e.g., ComDEALL Developmental Checklist) were administered. Although diagnostic measures like ADOS-2 could not be administered due to prohibitive costs for training in LMICs, a 30-minute semi-structured play session with the clinician was video recorded and coded for behaviours under the domains of social communication, play skills and restricted repetitive behaviors (RRBs). A clinical best estimate (CBE) diagnosis was made based on DSM-5.

Results: History from parents revealed that the child largely used previously heard lines from stories or poems during interactions (indicative of gestalt processing of language), had poor communication intent and RRBs/sensory patterns like smelling pungent odours, playing with shadows/reflecting surfaces, touching different surfaces, hypersensitivity to light. Formal assessments showed delay across all developmental domains, with longest delay in social skills (Fig 1). Play observation revealed inconsistent joint attention, poor verbal/nonverbal imitation, limited use of gestures, poor social engagement and reciprocity, reduced sharing of interests, insufficient pretend play, a preference for solo play, smelling toys and preoccupation with specific parts of objects. Motor, language, social communication delay, and RRBs can be present in children with autism, hearing impairment (HI), and severe GDD. The challenge was with diagnosing ASD in the presence of GDD and HI although the child was fitted with CI bilaterally at young age. A recommendation for tailored intervention with focus on sensory integration and social communication was made.

Conclusions: Diagnosing ASD in presence of multiple disabilities is challenging. Was the delay in receiving diagnosis of ASD due to delay in reaching out for assessments due to the pandemic or due to the nature of diagnostic overshadowing cannot be commented upon. Awareness of occurrence of ASD in DBS, timely diagnosis, and initiation of intervention are key for good outcomes.

424.271 (Poster) Does Cognitive-Behavioral Therapy Treatment of Anxiety Improve Sleep in Autistic Children?

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Background: Sufficient quality and duration of sleep are necessary for optimal neurobehavioral functioning in all individuals. Sleep problems occur frequently in autistic children and persist from childhood into adolescence. Prior work suggests that co-occurring anxiety correlates with sleep disturbance in autistic children. However, the literature does not clarify the directionality of this relationship or whether treating anxiety might improve sleep in autistic children.

Objectives: This study examined (a) the correlation between baseline sleep problems and anxiety severity in autistic children, and (b) how sleep problems change with anxiety treatment.

Methods: Ninety-six autistic children, ages 4 to 14 years, were enrolled in an anxiety-focused treatment study utilizing a stepped-care cognitive-behavioral therapy approach. Measures of anxiety and sleep were collected pre-treatment, mid-treatment and immediately post-treatment. Measures included a clinician-rated measure of severity of anxiety symptoms - the Pediatric Anxiety Rating Scale (PARS) and a parent-rated measure of sleep behaviors - the Children's Sleep Habits Questionnaire, Short Form/Abbreviated (CSHQ-SF). Higher PARS scores are indicative of higher severity of anxiety symptoms and higher CSHQ-SF scores indicate more frequent occurrence of sleep problems. Correlation between baseline PARS total severity scores and CSHQ-SF total scores were calculated using Pearson correlations. Paired t-tests were used to compare CSHQ-SF total scores at each time point to determine if there were significant changes in sleep habits as a function of anxiety treatment. For the 43 individuals who had CSHQ-SF assessments at all three time points, a repeated measures ANOVA was performed to compare the effect of treatment on total CSHQ scores.
Results: Of the 93 children who completed baseline assessments, 57 had mid-point assessment data and 48 had post-treatment assessment data. Baseline elevated PARS scores were positively correlated with baseline elevated CSHQ-SF scores (Pearson's correlation: $0.31$, $p = 0.003$). Via paired t-tests, there was a significant reduction in CSHQ-SF total scores from baseline to mid-treatment ($p <=0.001$) and again from mid-treatment to post-treatment ($p=0.021$). For participants with data at all time points, there was a statistically significant improvement (reduction) in CSHQ-SF scores over the course of treatment $[F(2) = 17.13, p <=0.001]$. 

Conclusions: Clinician-rated anxiety symptom severity in autistic children is positively correlated with parent-reported sleep problems. Cognitive-behavioral therapy for anxiety symptoms was associated with improvements in parent-reported sleep habits among autistic children.

424.272 (Poster) Effortful Control and Emotional Reactivity at Age 2 Predict Internalizing and Externalizing Symptoms at Age 3 in Toddlers with and without Autism

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Background:

Internalizing (e.g., anxiety) and externalizing (e.g., aggression) symptoms occur in many children with autism (Vaillancourt et al., 2017). Models of their emergence stress the roles of early negative and positive emotions (Behrendt et al., 2020; Putnam & Stifter, 2005) and self-regulation. Self-regulation can both moderate early emotional reactivity and serve as a direct predictor of later internalizing/externalizing problems (An & Kochanska, 2020; Lonigan et al., 2009). Research on predictors of internalizing/externalizing symptoms in children with autism is limited.

Objectives:

Determine if 1) 3-year-olds with autism differ from peers on I/E symptoms; 2) Time 1 (age 2) emotional reactivity (joy, frustration) during standardized induction tasks predicts I/E symptoms at Time 2; and 3) Time 1 (age 2) self-regulation, alone or in combination with emotional reactivity, predicts I/E symptoms at Time 2.

Methods:

Participants included age-matched toddlers with autism (n=67; 81% male) and without autism (n=81; 58% male, including siblings of children with autism (SIB; n=26), toddlers with typical development (TD; n=24) or with atypical development (ATP; n=31)). At Time1 ($M_{age}=21.35m, SD=3.38$), children underwent six Laboratory Temperament Assessment Battery (LabTAB)-based tasks (Goldsmith & Rothbart, 1999) eliciting mild frustration and joy. Peak reactivity for joy (LabTAB-Joy) and frustration (LabTAB-Frustration) was coded off-line and averaged across facial, bodily, and vocal channels. At Time1, parents completed the Early Childhood Behavior Questionnaire (ECBQ; Putnam et al., 2006), yielding Effortful Control (ECBQ-EC) scores, and at Time2 ($M_{age}=39.16m, SD=3.67$), the Early Childhood Inventory-5 (ECI-5; Sprafkin & Gadow, 2014), yielding Internalizing and Externalizing composites. Group (4) x sex (2) general linear models examined differences in Internalizing and Externalizing scores with NVDQ and sex as covariates; multiple linear regressions tested contributions of Time1 LabTAB-Joy, LabTAB-Frustration, ECBQ-EC, ADOS-SA, sex, and NVDQ to Time2 Internalizing or Externalizing scores.

Results:

There were significant effects of group for Internalizing ($p<.01$) but not for Externalizing ($p=0.638$) scores; Neither sex ($p=.694$) nor NVDQ ($ps=.413$) contributed to the model. Planned contrasts indicated toddlers with autism had significantly higher Internalizing symptoms than ATP ($p<.002, d=72$), SIB ($p<.001, d=1.48$), and TD ($p<0.001, d=1.38$). The regression predicting Time 2 Internalizing scores was significant (adj $R^2=0.258, F(8,131)=8.891, p<.001$); Time 1 ADOS-SA ($\beta=.310, p=.002$) and ECBQ-EC ($\beta=-.297, p=.003$) were significant predictors. For Time 2 Externalizing, significant predictors of the regression (adj $R^2=0.091, F(8,131)= 3.13, p=.005$) included ECBQ-EC ($\beta=-.482, p<.001$) and the interaction between EC and LabTAB-Joy ($\beta=.290, p=0.009$), such that the negative association between EC and Externalizing was strongest at low levels of LabTAB-Joy.

Conclusions:

Internalizing (but not externalizing) symptoms were elevated in 3-year-olds with autism compared to toddlers with neurodiverse developmental profiles, controlling for sex and NVDQ. Severity of internalizing symptoms at age 3 was predicted by autism severity and self-regulation assessed one year earlier. 2-year predictors of externalizing problems at 3 years included self-regulation as well as the interaction between observed joy and self-regulation; higher levels of joy weakened the relationship between poor self-regulation and later
externalizing symptoms, suggesting a possible protective effect of positive reactivity. Targeting self-regulation in intervention programs may help ameliorate future emotional and behavioral challenges.

424.273 (Poster) Emotion Dysregulation in Autistic Individuals: A Meta-Analysis
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Background: As psychiatric disorders frequently co-occur in autistic individuals (Simonoff et al., 2008), it is important to identify underlying mechanisms that may relate to the development of these symptoms in autistic individuals, as they may contribute to difficulties across the lifespan and reduced quality of life (Connor et al., 2020; Hollocks et al., 2019). Emotion dysregulation (ED) is a deficit in executive functioning defined as the reduced ability to effectively regulate emotional experiences and expressions when presented with changing environmental stimuli (Gross, 2007). ED is experienced at a higher rate in autistic compared to typically-developing (TD) people, and has been proposed to underlie both internalizing and behavioral disorders in autism spectrum disorder (ASD; Conner et al., 2021; Uhl et al., 2019). Despite the higher rates of ED in autistic people, there has been no quantitative synthesis of the literature of ED severity compared to other populations, which is important in order to reveal patterns and contributing factors of ED severity across multiple studies that may be otherwise obscured.

Objectives: This project sought to synthesize the body of literature to date on ED in autism by conducting a meta-analysis 1) to assess the magnitude of difference in ED severity between autistic populations compared to TD and/or OC (e.g., anxiety) groups, and 2) to explore the role of potential moderators (e.g., sex composition, mean age) that may contribute to the heightened risk of ED in ASD.

Methods: Following a literature search of PubMed, PsycINFO, MEDLINE, and PsycArticles, adhering to the PRISMA guidelines, twenty studies were included in the analyses (Total \( N = 8,778 \) [4,287 ASD, 2,881 TD, 1,609 OC]; see Table 1). Meta-analyses were used to examine the effect size (Hedge’s \( g \)) of differences in ED severity between groups. Additional analyses examined potential moderators (sex composition, mean age) via meta-regression, and publication bias.

Results: Overall, the autistic group had significantly higher ED relative to the comparison groups (\( g = 1.03, k = 20, 95\% \) confidence interval \([0.68-1.38]\), \( p < .001 \); Figure 1), indicating a large effect (Cohen, 1982). Subgroup analyses indicated a large effect when compared to TD group (\( g = 1.71, k = 14, 95\% \) CI[1.32–2.11], \( p < .001 \)) and a small-to-medium effect compared to OC groups (\( g = 0.44, k = 11, 95\% \) CI[0.09–0.80], \( p = .02 \)). Moderator analyses revealed more pronounced differences between autistic versus overall comparisons groups in samples with higher percentage of males (\( b = 1.56, p = .01 \)). No evidence of publication bias was found.

Conclusions: Our findings insinuate that autistic individuals experience significantly higher ED severity compared to TD and their OC counterparts. Sex composition was a significant moderator, underscoring the importance of directly examining gender differences in ED severity in autistic individuals in future investigations of ED in autism. Given that autistic individuals may be at heightened risk for experiencing a myriad of difficulties associated with ED, future studies should seek to better understand factors associated with the expression of ED (e.g., neural processes; Dennis et al., 2010), as well as to examine effects of intervention that includes emotion regulation as a target of treatment (Beck et al., 2020).

424.274 (Poster) Emotion Regulation in Children and Adolescents with Autism Spectrum Disorder: A Systematic Review and Meta-Analysis
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Background: Children and adolescents with Autism Spectrum Disorder (ASD) usually present difficulties in emotion regulation (ER) that interfere with their adaptive functioning. These difficulties can trigger episodes of disruptive behavior that cause significant discomfort both in the person with ASD and in their family environment. Although there is evidence of the high prevalence of these difficulties in children and adolescents with ASD, the frequency compared to the general population, as well as the relationship with clinically significant variables (e.g., internalizing symptomatology) have not been yet explored exhaustively.

Objectives: The objective of this study was to systematically review the evidence on ER in children and adolescents with ASD and its relationship with the following variables: internalizing and externalizing symptoms, intellectual functioning and social skills.

Methods: An electronic search of four databases (PsycINFO, PubMed, Scopus, Web of Science) was conducted to identify potential studies. The manual search consisted in the screening of the reference list of related articles and contacting corresponding authors of topic-related studies in order to request unpublished data. Only peer-reviewed English-written articles addressing emotion regulation in children and/or adolescents were included. Non-empirical sutdies (e.g. review articles) and studies with less than 10 participants with ASD were excluded.
Results: A total of 59 studies were included in the systematic review. A set of meta-analyses were conducted in order to compare ASD participants with non-ASD participants in subjective and objective measures of ER. Statistical significant between-group differences was found for both subjective (Cohen’s d = -1.61, 95% CI [-1.9, -.132], p < .001) and objective measures of ER (Respiratory Sinus Arrhythmia: Cohen’s d = -.28, 95% CI [-.46, -.173], p = .002; Heart rate: Cohen’s d = .69, 95% CI [.46, .92], p < .001), suggesting lower ER skills in the ASD group. Also, statistical significant differences were found for the use of adaptive (Cohen’s d = -.16, 95% CI [-.30, -.017], p = .03) and maladaptive strategies of ER (Cohen’s d = .41, 95% CI [.22, .603], p < .001), with the ASD group showing more frequently maladaptive ER strategies than the non-ASD participants. Significant associations were found for subjective ER measures and ASD severity (Cohen’s d = -.19, 95% CI [-.29, -.089], p < .001), and social skills (Cohen’s d = .62, 95% CI [.45, .74], p < .001), with participants with greater ER difficulties showing more severe ASD and poorer social skills. Finally, internalizing symptomatology was significantly correlated with both adaptive (Cohen’s d = -.27, 95% CI [-.34, -.21], p < .001) and maladaptive ER strategies (Cohen’s d = .29, 95% CI [.19, .39], p < .001), pointing at the use of maladaptive ER strategies being associated with higher prevalence of internalizing symptoms. No significant association was found between ER measures and intellectual functioning.

Conclusions: ER skills are significantly impaired in children and adolescents with ASD compared to their peers without ASD. The severity of ASD and difficulties in social skills are significantly related to difficulties in ER. Physiological measures could capture ER difficulties in this group.

424.275 (Poster) Emotional and Behavioral Problems in a Group of Brazilian Adults with Autism Spectrum Disorder
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Background: Previous studies show a high prevalence of emotional symptoms (internalizing) and behavioral problems (externalizing) in adults with autism spectrum disorder (ASD) when compared to the general population. Due to the difficulty in accessing health services in low- and middle-income countries, this prevalence is unknown, impacting the lack of adequate mental health care for this population. In Brazil there are few studies identifying psychopathologies in adults with ASD.

Objectives: To examine the prevalence of internalizing and externalizing problems in a group of Brazilian adults with ASD.

Methods: This is a cross-sectional quantitative study with no probabilistic sample of eighty-three individuals aged 18-58 years (mean=34.00; SD=10.08), 53 of whom were women (63.9%), diagnosed by a specialist physician. Behavioral and emotional problems were assessed by Adult Self-Report (ASR/18-59), considering empirically based scales, DSM-oriented scales and the three higher-order factor scales of internalizing, externalizing and total problems.

Results: Descriptive statistics for T-scores showed clinical classification of the individuals in the empirically based scales anxiety/depression, withdrawn, somatic complaints and in the internalizing higher-order factor scales. Clinical classification was verified also in problems with thoughts and inattention problems. In the aggressive and rule-breaking scales, they are found in the borderline range, as well as for the total score in externalizing problems. While on the intrusiveness scale, the observed average is within the expected range for the age. In the DSM-oriented scales, the group is in the clinical range for the anxiety, depression, somatic problems, avoidant disorder and ADHD problems scales. Only on the Antisocial scale did the mean scores indicate a borderline range. Significantly greater impairments in women were observed in somatic, attention, and internalizing problems, as well as in DSM-oriented scales that indicate anxiety, somatic, and ADHD problems. On the DSM-oriented scales, the group was classified in the clinical range for anxiety disorders, depression, somatic problems, avoidant personality, and ADHD problems. Only on the antisocial scale the mean scores indicate a borderline range. Significantly greater impairments in women were observed in somatic complaints, attention, and total internalizing problems, as well as in DSM-oriented scales that indicate anxiety disorders, somatic complaints, and ADHD problems. There was a high percentage (≥70%) of individuals with clinical range on the following empirically based scales: withdrawn, thought problems, and total internalizing problems. In the DSM-oriented scales, only in the avoidant personality problems scale a higher percentage of individuals with a clinical range was observed (86.74%). Between 60 and 69% of the group was classified in clinical range for: anxiety/depression on the syndrome scale and total behavior problems. On the DSM-oriented scales, this percentage was observed in depression, anxiety and ADHD problems. There was a positive, low, but significant correlation between total problems and age (r=0.31; p=0.005).

Conclusions: Although with a small sample, this was the first study to raise emotional and behavioral problems in a sample of autistic adults in Brazil, indicating high rates of clinical profiles mainly for internalizing symptoms.

424.276 (Poster) Epilepsy in Autism: Prevalence and Associated Factors in a Large Inpatient Psychiatric Sample
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Conclusions: ER skills are significantly impaired in children and adolescents with ASD compared to their peers without ASD. The severity of ASD and difficulties in social skills are significantly related to difficulties in ER. Physiological measures could capture ER difficulties in this group.

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Background: Previous studies show a high prevalence of emotional symptoms (internalizing) and behavioral problems (externalizing) in adults with autism spectrum disorder (ASD) when compared to the general population. Due to the difficulty in accessing health services in low- and middle-income countries, this prevalence is unknown, impacting the lack of adequate mental health care for this population. In Brazil there are few studies identifying psychopathologies in adults with ASD.

Objectives: To examine the prevalence of internalizing and externalizing problems in a group of Brazilian adults with ASD.

Methods: This is a cross-sectional quantitative study with no probabilistic sample of eighty-three individuals aged 18-58 years (mean=34.00; SD=10.08), 53 of whom were women (63.9%), diagnosed by a specialist physician. Behavioral and emotional problems were assessed by Adult Self-Report (ASR/18-59), considering empirically based scales, DSM-oriented scales and the three higher-order factor scales of internalizing, externalizing and total problems.

Results: Descriptive statistics for T-scores showed clinical classification of the individuals in the empirically based scales anxiety/depression, withdrawn, somatic complaints and in the internalizing higher-order factor scales. Clinical classification was verified also in problems with thoughts and inattention problems. In the aggressive and rule-breaking scales, they are found in the borderline range, as well as for the total score in externalizing problems. While on the intrusiveness scale, the observed average is within the expected range for the age. In the DSM-oriented scales, the group is in the clinical range for the anxiety, depression, somatic problems, avoidant disorder and ADHD problems scales. Only on the Antisocial scale did the mean scores indicate a borderline range. Significantly greater impairments in women were observed in somatic, attention, and internalizing problems, as well as in DSM-oriented scales that indicate anxiety, somatic, and ADHD problems. On the DSM-oriented scales, the group was classified in the clinical range for anxiety disorders, depression, somatic problems, avoidant personality, and ADHD problems. Only on the antisocial scale the mean scores indicate a borderline range. Significantly greater impairments in women were observed in somatic complaints, attention, and total internalizing problems, as well as in DSM-oriented scales that indicate anxiety disorders, somatic complaints, and ADHD problems. There was a high percentage (≥70%) of individuals with clinical range on the following empirically based scales: withdrawn, thought problems, and total internalizing problems. In the DSM-oriented scales, only in the avoidant personality problems scale a higher percentage of individuals with a clinical range was observed (86.74%). Between 60 and 69% of the group was classified in clinical range for: anxiety/depression on the syndrome scale and total behavior problems. On the DSM-oriented scales, this percentage was observed in depression, anxiety and ADHD problems. There was a positive, low, but significant correlation between total problems and age (r=0.31; p=0.005).

Conclusions: Although with a small sample, this was the first study to raise emotional and behavioral problems in a sample of autistic adults in Brazil, indicating high rates of clinical profiles mainly for internalizing symptoms.

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K. Kidity, K. Luo, M. S. Siegel, and C. A. Mazefsky, (1)UPMC Children’s Hospital of Pittsburgh, Pittsburgh, PA, (2)Department of Psychiatry, University of Pittsburgh School of Medicine, Pittsburgh, PA, (3)Center for Clinical and Translational Science, MaineHealth, Portland, ME
Background: Recent systematic reviews and meta-analyses reveal that anxiety disorders are highly prevalent in youth with Autism Spectrum Disorder (ASD). Given the high prevalence of anxiety among this population, recent research has focused on investigating potential mechanisms underpinning anxiety.

Objectives: The purpose of the current study was to examine the relationship between anxiety and social functioning in youth with ASD in a large heterogeneous dataset as well as the moderating influence of sex, age, and IQ on the relationship between overall social functioning and anxiety symptoms.

Methods: The current study involved secondary data analysis, using data from the Simons Foundation for Autism Research Initiative. The sample included 2745 individuals aged 4 to 18 and was well-characterized and heterogeneous in IQ. Parent- and teacher-report of anxiety symptoms and social functioning were included in the analyses.

Results: Based on both parent and teacher data, the social functioning domains (social awareness, social cognition, social communication, social motivation, and restricted interests and repetitive behaviours) accounted for a substantial portion of the variance in anxiety, controlling for age, sex, and IQ (24% for parent report and 27% for teacher report). All five social functioning domains were significant predictors of anxiety. For parent data, IQ was found to moderate the relationship between anxiety and social functioning, suggesting that when social functioning is low, youth without intellectual disability show higher anxiety than youth with intellectual disability.

Conclusions: The results indicate that social functioning is a significant predictor of anxiety. The knowledge that social functioning accounts for a large percentage of the variance in anxiety in this population will help inform behavioural mental health interventions. Interventions that target social functioning (e.g., social skills training programs) may enhance the effectiveness of treatment for youth with ASD. In addition, the results of the present study would assist in identifying at-risk youth (i.e., those with low social functioning) and developing preventive therapeutic and school-based interventions with the goal of improving youth’s social functioning and social experiences.
424.278 (Poster) Examining the Relationship between Autistic and Neurotypical Children’s Sleep and Adaptive Behavior
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Background: Many autistic children have poor sleep quality including difficulties falling asleep and staying asleep through the night. Many autistic children also have difficulties with adaptive behaviors, such as communication and daily living skills. Previous research has indicated a strong relationship between sleep and adaptive behavior in neurotypical children, but less is known about this relationship in autistic children and adolescents.

Objectives: The current study aimed to determine the relationship between autistic children’s sleep (e.g., daytime sleepiness, insomnia) and their adaptive behavior (e.g., communication skills, daily living skills, social skills).

Methods: We tested 45 autistic (Male=37, Female=8; Mage=13.7 years, SEage=2.96, Rangeage=7.81-17.80) and 63 neurotypical (Male=43, Female=20; Mage=12.9 years, SEage=3.06, Rangeage=7.37-18.2) children and adolescents. Participants reported their sleep on the Pediatric Daytime Sleepiness Scale (PDSS) and Women’s Health Initiative Insomnia Rating Scale (WHIIRS). Participants’ guardians reported the participants’ adaptive behavior abilities on the Vineland-3.

Results: Daytime Sleepiness

Examining reports of daytime sleepiness on the PDSS, autistic and neurotypical children were similar overall, but there were significant differences on two items. Autistic children (M=1.2, SD=0.76) reported feeling less alert most of the day compared to neurotypical children (M=0.84, SD=0.83, Welch’s t=2.34, p=.022). Autistic children (M=1.8, SD=1.42) also reported having to be awoken in the morning by someone more often than neurotypical children (M=1.19, SD=1.31, Welch’s t=2.27, p=.026).

Insomnia Symptoms

Examining reports of insomnia symptoms on the WHIIRS, autistic and neurotypical children were similar overall, but autistic children (M=0.98, SD=1.18) reported that their sleep difficulty was more likely to interfere with their daily functioning compared to neurotypical children (M=0.48, SD=0.83, Welch’s t=2.35, p=.022).

Relationship between Adaptive Behavior and Sleep scores

Due to autistic children reporting that their sleep was more likely to interfere with their daily functioning, we examined the relationships between autistic children’s adaptive behavior scores on the Vineland-3 and their sleep scores on the PDSS and WHIIRS. We found a significant negative relationship between autistic children’s feelings of being alert throughout their caregivers’ ratings of their overall adaptive behavior (Pearson’s r=-0.376, p=.031). More specifically, this appears to be due to the relationship between autistic children’s feelings of alertness and their daily living skills scores (Pearson’s r=-0.475, p=.005), but not their social or communication skills (ps>.05).

We also found significant relationships between autistic children’s reports of waking up too early and being unable to fall back asleep (Pearson’s r=-0.370, p=.037) and their overall insomnia symptoms (Pearson’s r=-0.407, p=.021) with their caregivers’ ratings of their social skills.

Conclusions: Overall, autistic children reported their symptoms of daytime sleepiness and insomnia at similar rates of neurotypical children. Despite these similarities there were some key differences. Autistic children reported being less alert throughout the day and that their sleepiness was more likely to impact their daily functioning. Notably, autistic children’s sleep ratings correlated with their caregivers’ ratings of their daily living skills and social skills. These results indicate that sleep quality and feelings of alertness likely affect autistic children’s daily functioning and thus warrant further research to improve their quality of life.

424.279 (Poster) Exploring Social and Sensory Differences in Autistic and Non-Autistic Individuals with Anorexia Nervosa and Their Parents.
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Background:

Accumulating research evidence has established an overlap between autism and eating disorders, particularly anorexia nervosa (AN), and subsequent qualitative studies suggest that current treatments fail to meet their unique set of needs. As a result, research has begun to explore possible underlying mechanisms, with a broad range of factors implicated for autistic individuals including social and sensory
differences. There remains scope, however, to explore and compare these factors across autistic and non-autistic adults with anorexia in an effort to untangle common and condition-specific factors. Furthermore, parenting an individual with autism or anorexia has been found to be associated with multi-dimensional challenges, and it is important this broader social context is included in our understandings.

Objectives:

The current study will therefore focus on exploring social and sensory differences in both autistic and non-autistic individuals with anorexia in an attempt to untangle common and autism-specific mechanisms in acute and recovered stages of anorexia.

Methods:

Autistic and non-autistic individuals (18+ years) were interviewed online with a parent/primary caregiver. While previous studies have encouragingly adopted a multi-perspective approach, to date no study has explored these perspectives as dyads. Dyadic interviews not only provide multiple perspectives but also allows for interaction of perspectives. Interviews are being analysed using Interpretative Phenomenological Analysis. An autistic co-researcher and expert by experience of anorexia has assisted in the development of the interview schedule, as well as in the development of the themes.

Results:

14 dyads took part in the study. Preliminary findings suggest both common and autism-specific factors. Difficulties with social relationships, social isolation and socio-emotional processing and communication were common across both autistic and non-autistic participants. Social comparisons appear to play more of a role for non-autistic individuals, while only autistic participants reflected that they sometimes perceived their interactions to be more different than in deficit. Differences in interoception (the awareness and identification of internal bodily signals) were reported across both groups, and smell and taste sensitivities appeared to be more pronounced for both groups during the acute stages of anorexia. Autistic participants displayed more pronounced and consistent sensory sensitivities across all senses, including proprioception (perception of the position and movement of the body), and these sensitivities appear to be integrally linked with emotion and stress responses.

Conclusions:

There appears to be both common and condition-specific factors involved in the development, maintenance and recovery from anorexia. The personal and clinical significance of identifying possible common and autism-specific differences in social and sensory processing will be discussed, and the importance of involving autistic and neurodiverse perspectives in the broader field of eating disorders will be emphasised.

424.280 **(Poster)** Exploring the Association between Social Skills and Social Communication Impairments and Depression in Youth with Autism Spectrum Disorder

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**Background:** High comorbidity rates of depression are common in autistic individuals (Ghazuddin et al., 2002), and critical to investigate due to their associations with numerous negative factors, including suicidality and other self-injury behaviours. To date, there are mixed findings when investigating the associations between depression and social communication difficulties (Greenlee et al., 2020; Vikerstaff et al., 2007) and little on the association between social skills and depression (Bauminger & Kasari, 2000).

**Objectives:** The current study aimed to further understand the association between social (dis)abilities and depressive symptoms in autistic youth. We developed two primary objectives: the first being to determine if social skills predict depressive symptoms, and the second to investigate the inverse – if higher social communication difficulties predict higher depressive symptoms.

**Methods:** Data for both studies was obtained from the Province of Ontario Neurodevelopmental Network (POND) which is a research network that includes five hospitals and universities across Ontario. Study 1 included 542 autistic youth (mean age=11.82 SD=2.67, 420 males), and study 2 included 453 autistic youth (mean age=11.80 years, SD=2.69, 353 males, with 429 overlapping participants between the two studies). All youth had received a diagnosis of ASD from a medical professional prior to participation in the data collection, and diagnosis was confirmed using the ADOS (Lord et al., 2001; Lord et al., 2012), and the ADI - R (Le Couteur et al., 2003). Study 1 used the Revised Children Anxiety and Depression Scale (RCADS-P; Chorpita et al., 2000) and The Adaptive Behavior Assessment System 2nd Edition (ABAS-II; Harrison & Oakland, 2003) to assess depression, anxiety and behaviour in the autistic youth, and study 2 used the RCADS-P and the ADOS 1-4 (participants assigned according to recommendations from Lord et al (2012)) to assess depression and
symptom severity. Specifically, study 2 combined social communication algorithm scores, with higher scores indicating greater difficulties (Lord et al., 2012).

Results: In study 1 we conducted a hierarchical multiple regression; after controlling for age, gender and IQ, results indicate that social communication difficulties did not significantly predict depressive symptoms, and depressive symptoms did not significantly predict social communication difficulties. A hierarchical regression was also run for study 2 to evaluate how social skills might predict depressive symptoms in autistic youth. After controlling for age, gender and IQ, lower social skills predicted higher depressive symptoms, and higher depressive symptoms predicted lower social skills.

Conclusions: The results from study 1 extend the limited available literature investigating the relationship between social communication difficulties and depressive symptomatology. Findings from study 2 aligned with our hypothesis and current available literature (e.g., Duan et al., 2022). The difference in our findings between studies may be partially explained through the different measures used (ABAS-II vs. ADOS) wherein one is parent-report while the other is observer-report. The focus on the association between definitive autism symptoms and depression highlighted the association between social skills and depressive symptoms in autistic youth. Results from our study emphasize the necessity for social skills training and support for autistic youth.

424.281 (Poster) Exploring the Effects of Co-Occurring ADHD and Anxiety on Sensory Processing Differences and Repetitive Behaviours in Autistic Children

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Background:

Autistic individuals are at higher risk of developing co-occurring psychiatric conditions, including ADHD and anxiety disorders, compared to the general population. Having a co-occurring condition is associated with wider range of functional impairment and higher needs for more support. Little is known about how co-occurring psychiatric disorders interact with core autism traits. In this study, we focus on the impact of co-occurring ADHD and anxiety on sensory processing differences and repetitive behaviours in a group of autistic children with and without ADHD, and those with only ADHD.

Objectives:

1. To assess sensory processing differences and repetitive behaviours in autistic children with and without ADHD, and children with ADHD.
2. To assess the effect of anxiety symptoms on sensory processing and repetitive behaviours in these groups.
3. To examine whether the presence of co-occurring ADHD may influence the relationship between sensory domains and subtypes of repetitive behaviours.

Methods:

Participants: We recruited 18 children with ASD only (14M, 4F), 54 children with ASD+ADHD (47M, 7F) and 69 children with ADHD only (49M, 20F). Age (between 8-13 years old) and IQ were matched.

Clinical measures: Sensory Processing Measure (SPM), The Repetitive Behaviour Scale (RBS), Screen for Child Anxiety Related Disorders (SCARED).

Analyses: A 1-way ANOVA was used to compare the mean scores for sensory processing, anxiety, and repetitive behaviours between the 3 groups. Then, we used mediation analyses to determine how anxiety, sensory processing and repetitive behaviours may be interrelated. Finally, we used Pearson’s correlation to assess the correlation between sensory domains and subtypes of repetitive behaviours between autistic children with and without ADHD. We plan additional moderation analyses of the association between anxiety, sensory differences and repetitive behaviours in the three groups.

Results:

There were significant group effects on sensory processing (p < 0.001), repetitive behaviours (p < 0.001), and anxiety (p < 0.001) with autistic children with co-occurring ADHD being most affected, followed by autism alone (Figure 1ABC). Across all groups, we found that anxiety, sensory processing differences and repetitive behaviours were positively intercorrelated. Anxiety partially mediates the
relationship between sensory processing differences and repetitive behaviours (Figure 1D). Effects of having ADHD and ASD on the relationship between sensory domains and subtypes of repetitive behaviours are shown in Table 1.

Conclusions:

Our results suggest that having co-occurring ADHD leads to high sensory processing difficulties and repetitive behaviours in autistic individuals. Moreover, anxiety has a partial mediation effect on the association between sensory differences and repetitive behaviours in ASD. In those with co-occurring ADHD, ADHD may lead to a broader range of repetitive behaviours including increased self-harm. This might be explained by wider affection of sensorimotor brain circuits in those individuals or may be related to higher anxiety levels which increase repetitive behaviours in an attempt to regulate emotions. The findings suggest that simultaneous consideration of sensory processing and co-occurring mental health issues can help address the heterogeneity of autism, improving targeted intervention and tailored care.

424.282 (Poster) GI Wanna Talk about Autism: A Qualitative, Participatory Study of Gastrointestinal Symptoms in Autistic Adults

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Background:

Gastrointestinal (GI) symptoms are common among autistic people and can be distressing and disabling. However, the lived experiences, needs, and priorities of autistic adults with GI symptoms have not been examined.

Objectives:

The goal of this study was to gain an understanding of the experiences, needs, and priorities of autistic adults with a range of support needs, as they pertain to GI health through qualitative interviews.

Methods:

This study adopted a participatory approach in which a 26-member Community Board of autistic and non-autistic adults with diverse professional and lived experiences contributed to the study design. Four researchers, including two autistic adults, conducted in-depth, semi-structured interviews with 27 participants: 21 autistic adults, four mothers of autistic adults, and one mother with their autistic adult child. Of the 21 autistic adults who participated on their own, ten were women and seven were men (14 cisgender; 3 transgender), and four were non-binary or gender non-conforming. All interviews took place via Zoom in video or audio format and were transcribed verbatim. Transcripts were reviewed by participants for accuracy and approval then analyzed using Interpretative Phenomenological Analysis. A five-person team (the four interviewers and an additional autistic researcher) used inductive coding to identify patterns of meaning in personal lived experiences. A final codebook was generated through an iterative process of individual transcript coding and group consolidation and refinement of codes.

Results:

Our analysis demonstrates that in many instances, GI symptoms have profound and extensive negative impacts on all areas of life (“...I don’t know if I’ll be able to hold down a full-time job or not...Will I ever be able to date or do anything?”). Autistic adults described the effort, time, planning, and other resources used to prevent or manage GI symptoms. Common triggers of GI issues include stress, sensory overwhelm, and changes in routine and food, though triggers were not always apparent. Unfortunately, most autistic adults and their parents described primarily frustrating and unhelpful healthcare interactions. They found the system difficult, unpleasant, and expensive to navigate and felt healthcare providers were often dismissive and did not offer useful diagnoses or advice (“They weren’t concerned at all.”). Autistic adults relied on medications, extensive planning and preparation, avoidance of triggers, and positive supports such as family or friends to help prevent and manage their symptoms.

Conclusions:

This study reveals the frequency, magnitude, and ways in which GI symptoms shape the experiences and opportunities of autistic adults. It also captures the many and varied ways individuals manage their symptoms to carry out their lives as best they can. These results, with input from our Community Board, will serve to inform the next phase of this study in developing recommendations for potential services,
Background: Prevalence estimates of co-occurring neurological, psychiatric, and medical conditions have yet to be firmly established in autistic children and adults. Having reliable estimates of co-occurring conditions improves their recognition and treatment, improving the quality of life of autistic persons and their caregivers.

Objectives: The present study aims to determine the best estimates of neurological, psychiatric, and medical co-occurring conditions in children and adults with Autism Spectrum Disorder (ASD).

Methods: The research question progressed within the development of the Italian Guideline for the diagnosis and management of children, adolescents, and adults with ASD. The protocol was registered within the PROSPERO database (CRD42019132347) and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) statement. The co-occurring conditions listed in the search strategy were reviewed by the Italian Guidelines Panel members, including 36 professionals, carers, and persons with ASD, and integrated by the stakeholder’s suggestion collected over a four-week period. A systematic search strategy of articles indexed from the inception to May 2022 using PubMed and PsycINFO bibliographic databases was performed. Six blinded authors screened records for inclusion/exclusion criteria and extracted the data. The risk of bias was evaluated using the quality assessment checklist for prevalence studies (Hoy et al., 2012). Criticisms were debated by the review team and content experts. Pooled prevalence estimates for different co-occurring conditions in ASD were determined using random effects models. Heterogeneity was investigated using random-effects meta-regression models.

Results: Of 19,535 studies, 341 publications were included for systematic review and meta-analysis. Meta-analyses of 23 co-occurring conditions with at least 15 studies included were performed. 40% of the included studies were conducted in the US, and 75% were clinical sample-based studies. Among the point prevalence, feeding disorder, 53% (95%CI 43%-64%), sleep-wake problems, 45%, (35-55%), gastrointestinal problems, 40% (34-46%), ADHD, 38% (33-44%), anxiety disorder, 37% (33-44%), overweight/obesity, 35% (29-42%), elimination disorder, 32% (21-43%), sleep-wake disorder, 30% (19-41%), disruptive behavior, 29% (24-34%), were the most frequent co-occurring conditions analyzed. On one hand, studies investigating ADHD (45 vs 24%, p<0.0001), anxiety disorder (43 vs 29%, p=0.033), and sleep-wake problem (46 vs 16%, p=0.0001) prevalence in children<18 years old showed higher prevalence compared to those including adults. Depressive disorder (15 vs 36%, p<0.0001), epilepsy (15 vs 23%, p=0.0001), and gastrointestinal disorder (15 vs 37%, p=0.005) were found to be prevalent in studies including adults compared to those with children. Estimates in clinical sample-based studies were generally higher than in population/registry-based studies. Gender and intellectual disability were associated with heterogeneity across studies (gender for tic disorder, depressive disorder, epilepsy, sleep-wake problem, affective disorder, gastrointestinal disorder, Down Syndrome; intellectual disabilities for schizophrenia).

Conclusions: Co-occurring conditions worsen the quality of life of autistic individuals and their carers. Notably, the awareness of the presence of specific co-occurring conditions associated with autism allows for targeted interventions and better outcomes.
predictors of GI symptoms: sensory over-responsivity, anxiety, and neuroticism. Participants were divided into a high autistic traits group (AQ+, n = 72) and a low autistic traits group (AQ-, n = 83) using an Autistic Quotient cut-off score of 32. Fisher’s Exact Test and independent samples t-tests were used to compare AQ+ and AQ- groups for GI symptom severity and GI symptom predictors. A hierarchical multiple regression analysis and mediation analyses were conducted to analyse the predictive and mediatary effects of autistic traits, sensory-over-responsivity, anxiety, and neuroticism on GI symptom severity.

Results: Compared to the AQ- group, the AQ+ group were more likely to have at least one GI symptom (p = .001), and had more severe GI symptoms overall (t(153) = -3.51, p < .001, d = 0.57). The AQ+ group also had higher levels of all GI symptom predictors: sensory-over responsibility (t(153) = -10.65, p < .001, d = 1.72), anxiety (t(153) = -4.75, p < .001, d = 0.77), and neuroticism (t(153) = -3.98, p < .001, d = 0.64). A hierarchical multiple regression analysis found that autistic traits were a significant predictor of GI symptom severity, but this relationship was not significant following the inclusion of the other predictors. The final model explained 49% of the variance in GI symptoms severity. Anxiety emerged as the only independent predictor of GI symptoms severity (β = .28, t(146) = 3.49, p < .001). The relationship between autistic traits and GI symptom severity was fully mediated by anxiety in the whole sample.

Conclusions: The prevalence and severity of GI symptoms in autistic adults is attributable to higher levels of anxiety. Future research should investigate the effect of reducing anxiety in order to treat GI symptoms in autistic adults.

424.285 (Poster) Gastrointestinal Symptoms in Autistic Children and Their Relationship Maternal Mental Health
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Background: Autistic children suffer from comorbid somatic or psychiatric disorders. FGIDs are a group of disorders characterized by symptoms such as abdominal discomfort, dysphagia, epigastric pain, constipation without any pathological findings on testing and are associated with low quality of life (QoL) and comorbid psychopathologies such as depression and anxiety. Functional gastrointestinal disorders (FGID) are more common in autistic children than their peers in the general population, however studies examining FGIDs with reliable and valid tools and investigating maternal QoL, depression and anxiety are limited.

Objectives: We aimed to describe the FGID symptoms in autistic children, compare the maternal QoL, depression and anxiety scores in autistic children, children with FGIDs and healthy controls.

Methods: In this cross-sectional study, the participants were recruited from child psychiatry outpatient unit and Turkish Autism Society for autism group (n=82), from pediatric gastroenterology outpatient units for FGID group (n=30). The control group (n=38) was recruited via snowballing. The autism severity was assessed via Childhood Autism Rating Scale, the FGID symptoms via ROME III criteria, maternal QoL, depression and anxiety symptoms via Quality of Life in Autism Questionnaire-parent version, Beck Depression and Beck Anxiety Inventory, respectively. Group comparisons were made via ANOVA and post-hoc tests were conducted for normally distributed data on SPSS version 26. A probability level lower than 0.05 was set as statistical significance.

Results: Demographic variables such as age, parental education and socioeconomic status were similar between groups (p>0.05). Seventy percent of the autistic children met criteria for at least one FGID, and 52 % met criteria for at least two or more. The autism group had a higher M:F ratio than FGID and control groups (p=0.04). Functional constipation (56 %), functional dyspepsia (50 %) and abdominal pain (33 %) were the most prevalent FGIDS in autistic children. FGID symptoms did not differ according to age (p>0.05) or sex (p>0.05) in autistic children. The maternal QoL was lower (p<0.001) and depression and anxiety scores were higher (p=0.012 and p=0.001, respectively) in autism group compared to FGID and healthy control groups (Table 1). Maternal quality of life in autism group was strongly correlated with depression (rho=0.781, p<0.001) and anxiety scores (rho=0.591, p=0.001), and these correlations remained significant in linear regression analyses (p<0.001 and p=0.16).

Conclusions: Majority of autistic children in our sample had one or more FGIDs without prior referral to gastrointestinal units. Mothers of autistic children needed support for quality of life, depression, and anxiety. Early recognition and treatment of gastrointestinal disorders may help both individual and maternal well-being regarding reciprocal relationship between maternal mental health and behavioral difficulties seen in autistic children.

424.286 (Poster) Gastrointestinal and Behavioral Symptoms in Typically Developing Children and Children with Autism Spectrum Disorder
Background:
Up to 91% of children with autism spectrum disorder (ASD) experience gastrointestinal (GI) symptoms. The most common GI symptoms include abdominal pain with or without diarrhea, and chronic constipation with or without encopresis. GI symptoms have been associated with an increase in self-injurious behaviors, hyperactivity, irritability, and inhibition in individuals with ASD. In addition, anxiety is thought to play a role in GI symptoms in children with ASD. Studies have shown that children with ASD and GI symptoms scored higher on anxiety scales compared to typically developing (TD) peers.

Objectives:
The objective of this analysis is to compare GI and behavioral symptoms in TD children and those with ASD who present for an evaluation of clinically significant GI symptoms at specialized GI clinics.

Methods:
Children with GI symptoms warranting a colonoscopy and/or endoscopy were recruited to participate. Study procedures included a chart review to extract demographics, suspected food allergies, and medical diagnoses. Pediatric Quality of Life Inventory (PedsQL) Gastrointestinal Symptoms Module, Questionnaire on Pediatric Gastrointestinal Symptoms—Rome III Version (QPGS-RIII), cognitive assessments including IQ, autism diagnostic assessment, and behaviors using the Behavior Assessment System for Children, 3rd Edition (BASC-3) and Repetitive Behavior Scale – Revised (RBS-R) were obtained. Eligibility criteria for the TD group included Social Communication Questionnaire (SCQ) score <15 and ASD group with ADOS score above ASD cutoff.

Results:
51 participants ages 3-17 years were enrolled in the study. 7 TD participants were excluded from analysis due to inflammatory bowel diseases identified during GI workup (n=4), inflammatory musculoskeletal disease (n=1), developmental delay (n=1), and elevated SCQ score without ASD diagnosis (n=1). 3 ASD participants were excluded due to known genetic variants (n=2) and incomplete assessments (n=1). 41 children were included in the data analysis of which 34 were TD (17 M, 17 F) and 7 had ASD (5 M, 2 F). Based on the QPGS-RIII, fewer TD participants (47%) than in the ASD group (71%) met criteria for irritable bowel syndrome (IBS). Twice as many ASD participants (29%) than TD participants (12%) met criteria for functional constipation. The mean health-related quality of life (HRQoL) scores on the PedsQL for abdominal pain were impaired in both groups (42.97±19.52 in TD and 41.57±11.03 in ASD, p=0.82). Children in the ASD group had a trend for worse HRQoL score for constipation (65.36±18.58 vs 39.71±29.95, p=0.065). The mean anxiety scores on the BASC-3 were largely in the typical range, 53.03±11.47 in the TD group and 53.71±13.59 in the ASD group (p=0.904). Lastly, scores on the RBS-EC were significantly higher in the ASD group (4.15±8.02 vs. 46.29±18.09; p<0.001).

Conclusions:
IBS and constipation were more common in children with ASD. However, HRQoL scores were not a good differentiator between the TD and ASD groups; this may be due to small sample size. Lastly, these findings are consistent with previous studies showing that children with ASD exhibit more restricted and repetitive behaviors than TD peers. Future analyses include histological and immune analysis of biopsy samples to investigate possible underlying mechanisms for these differences.

424.287 (Poster) Gastrointestinal Issues in Autism Spectrum Disorders: Lack of Evidence for Specificity
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Background:
For many years the possibility that there is a gut-brain connection in ASD has been proposed, based largely on reports that many children with ASD have chronic constipation, diarrhoea and abdominal pain. There are also cases of gastroesophageal reflux and unusual gastroenterological reactions to some foods. Although there is an assumption that gastrointestinal abnormalities could be causally linked to ASD features in some children, the hypothesis that GI dysfunction might be similar in children with intellectual disabilities of genetic aetiology, irrespective of associated ASD, has never before been tested.

Objectives:
We aimed to identify the range of co-occurring gastrointestinal symptoms in a national UK sample of children with pathogenic CNVs or SNVs that were associated with ASD and to compare those comorbidities with children whose ID was not associated with ASD. We also tested the hypothesis that children who had gastrointestinal symptoms would experience a range of emotional and/or behavioural problems that were more extensive and more severe than those did not have such symptoms, irrespective of the severity of their intellectual disability or ASD characteristics.

Methods:

1282 children and young people, aged between 5-19 years (M=9.1, SD=3.9) were recruited via UK National Health Services and patient support groups. Of these, 34.3% (n=440) participants met criteria for an ASD. Participants were 54.7% male and 45.3% female. A standardised psychiatric interview was completed online (the Development and Wellbeing Assessment (DAWBA), as well as the Strengths and Difficulties Questionnaire (SDQ). Participant families also completed the Social Aptitude Scale and an account was obtained concerning gastrointestinal symptoms among other aspects of the child’s medical history.

Results:

GI problems affected a substantial proportion of participants overall (40.8%). The most common gastrointestinal symptoms were severe constipation (58.3%) and gastroesophageal reflux (51.8%). There was no significant difference ($\chi^2=3.9, p>.05$) when we compared the proportion of participants reporting GI problems in those with ASD (44.4%) with those whose ID was not associated with ASD (38.6%). Within the ASD sample there were no differences in symptomatology between those with and without reported GI problems on the SAS, which evaluates social understanding and behaviour (p= .17). Overall, SDQ rated emotional difficulties were significantly higher in those with GI symptoms than those without (p<.05), but there were no significant differences in the severity of conduct problems, hyperactivity or peer difficulties.

Conclusions:

Our study found no difference in the nature of GI symptoms when we compared children ASD of genetic aetiology with children whose ID was not associated with ASD traits. Although it had previously been assumed that the high prevalence of GI disorders in children with ASD could be linked causally to the condition, through increased intestinal permeability for example, it seems there is no specificity in that association.


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Background:

Little is known about the developmental trajectory of autistic children with intellectual disabilities (ID) of genetic aetiology in childhood. Longitudinal studies of affected children are rare and have been constrained by a focus on specific genetic anomalies, and small unrepresentative samples. The IMAGINE-ID research program had the opportunity to follow-up a nationally representative sample of children such children over a 5-year period, and to evaluate changes in behavioural phenotype from middle childhood to adolescence.

Objectives:

Our main aim was to measure behavioural changes in a diverse sample of children who had been ascertained with IDD of identified genetic aetiology. Using standardized annual assessments, we aimed to compare the trajectories of those affected by autism with IDD that is not associated with autistic traits.

Methods:

IMAGINE-ID participants (4-22years: M=9.3, SD=4.2) were initially recruited from UK NHS Genetic Services between 2015-2020. Of these, 41.4% reported their child had been diagnosed with ASD. Caregivers completed the Strengths and Difficulties Questionnaire (SDQ) in 2015-9 (T1) and again in 2021 (T2). The SDQ assesses children's emotional and behavioural adjustment in dimensional terms (emotional difficulties, conduct problems, hyperactivity and prosocial behaviour). Data was obtained at both T1 and T2 on 1,064 participants.

Results:
At T1, 64% of participants with ASD had scores in the ‘very high’ range, 18% in the ‘high’ range, 10% ‘above average’ range and 8% in the ‘typical’ range for children of equivalent age. Comparative proportions from participants whose ID was not associated with ASD were 43% in the ‘very high’ range, 15% in the ‘high’ range, 18% in the ‘above average’ range and 24% in the ‘average’ range. 59% of ASD participants remained in the same severity band category from T1 to T2, 17.4% deteriorated and moved into a higher severity band, whereas 20.8% improved and moved to a lower severity band. In comparison, in those without ASD 56.7% remained stable, 19.7% deteriorated and 23.6% improved.

At both T1 and T2 the mean total SDQ score for participants was in the ‘very high’ range for those with (M\(_1\)=21.9, SD\(_1\)=5.8; M\(_2\)=20.5, SD\(_2\)=5.9) and without ASD (M\(_1\)=18.3, SD\(_1\)=6.9; M\(_2\)=17.7, SD\(_2\)=6.6). Paired comparison of the SDQ subscales for those with ASD showed a significant reduction in conduct and hyperactivity symptoms and a significant improvement in prosocial ability from T1 to T2. Emotional difficulties remained in the ‘high’ range from T1 to T2. Data from children with ID that was not associated with autism also showed a significant reduction in conduct and hyperactivity difficulties from T1 to T2. Emotional difficulties also remained stable from T1 to T2, as did prosocial ability.

Conclusions:

In ASD that is associated with ID of genetic aetiology, co-occurring symptoms of conduct problems and hyperactivity tend to improve slightly over the period from middle childhood to adolescence, and there are associated improvements in prosocial behaviour too. By contrast, emotional difficulties remain stable. Significant improvements on the overall emotional and behavioural adjustment during follow-up was found more frequently in children whose ID was not associated with autism.
leading to a smaller network size, density, node degree and node strength on average over the 1st-5th postnatal week (Figure 2A). This altered network development predicts impaired cellular-scale information processing that may underlie the cognitive dysfunction in Rett syndrome. To develop a platform for testing novel strategies to restore function in human cortical networks, we created MeCP2-deficient ALI-COs from Rett syndrome patient-derived induced pluripotent stem cells (iPSCs) and isogenic controls. Both MeCP2-deficient and isogenic control iPSCs form viable ALI-COs and show network activity at days-in-vitro (DIV) 75, 100, 150 in culture (Figure 2B).

Conclusions: MeCP2-deficient murine cortical cultures reveal early impairments in the formation of functional cortical networks and key metrics of cellular-scale information processing. Restoration of cellular-scale network function provides a novel therapeutic target that can be implemented in our human cerebral organoid model of Rett syndrome and some genetic causes of ASD. Our analyses of network function in ALI-COs demonstrate that they can serve as a platform for investigating underlying mechanisms and screening new therapies. Our MEA network analysis pipeline (MEA-NAP) also enables other investigators to apply a cellular-scale network approach to other murine and human in vitro models of ASD.

417.324 (Poster) Altered Metabolite and Microbiota Profiles Associated with Social Deficits in Autistic Children and Their Unaffected Siblings
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Background: Autism spectrum disorder (ASD) is a highly clinically and genetically heterogeneous neurodevelopmental disorder with impaired social interactions and communication and restricted, repetitive behaviors/interests. Further, individuals with ASD display metabolic imbalances and gastrointestinal (GI) symptoms. According to the literature, metagenomic dysregulation is associated with the core symptoms of ASD. Herein, we compared the metabolite profiles and taxa diversity of ASD with their healthy biological unaffected siblings (US) in the same family, who shared similar environmental conditions. We hypothesized that bidirectional interactions between metabolite profiles in plasma and the gastrointestinal tract (brain-gut axis) and the role of the gut microbiota in ASD. However, little is known about the metagenomic-mediated ASD symptoms and there is no human data about biomarker for developing a safe and effective treatment for ASD.

Objectives: We aim to present a comprehensive comparison of extensively identified metagenome profiles of feces and plasma from cohorts of matched ASD, unaffected siblings, and typically developing control youths.

Methods: A total of 344 samples were assessed, including 242 ASD youth (M:F=214:28, age= 15.32±4.52), 102 US (M:F=61:41, age= 14.51±6.21) and 80 healthy controls (HC) (M:F= 63:17, age= 15.67±3.21). The data about ASD and other diagnoses (ADI-R, ADOS, K-SADS-E), autistic symptoms (SRS), and all the samples were analyzed with 16s metagenome sequencing as well as untargeted metabolomic profiling. We conducted metagenome analysis, and applied linear mixed effect model for statistical analysis to connect the microbiota and behavioral assessments done via QIIME2 and R, with the significance level being the FDR-corrected q value <0.05.

Results: The gut microbiome of ASD contained a higher species level of relative abundance of Lactobacillus mucosae, Lactococcus garvieae subsp garvieae, Clostridium baratii and butyricum than US and HC. The abundance of microbiota was associated with the concentration of L-asparagine, glucosamine 6-sulfate and DL-glutamate, which was found to have higher expression levels in ASD than US and HC. Further, the total SRS score significantly positively correlated to abundance of Lactobacillus mucosae and Lactococcus garvieae subsp garvieae in ASD and US. Finally, the concentration of L-asparagine as the moderator to interpret the altered microbiota and the severity of social deficits in youths with ASD and their siblings.

Conclusions: We identified the metagenome profiles among the ASD, unaffected siblings, and control groups via feces and plasma samples. The altered microbiota involved amino acid and protein metabolism demonstrated by peripheral circulation. Further, the correlation of specific microbiota in ASD and US with clinical social scores shows that gut microbiota dysbiosis may affect behavioral symptoms. These findings support the concept of healthy distal gut microflora in developing neural systems. Moreover, our results provide insights that altered metagenome profiles, as one of the possible etiologies of ASD, may be identified via the comparison between ASD probands and their healthy, unaffected siblings, who might be at risk of ASD.

417.325 (Poster) Autism-Linked Mutations Disrupt the Protein Network States That Mediate Homeostatic Plasticity
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Background: Following the -omics revolution, we are able to list the DNA, RNA and protein molecules that comprise a cell. However, a cell is a dynamic system that uses its protein machinery to sense and respond to signals in complex ways, integrating information from multiple sources. The network-level mechanisms that allow a proteome to perform these biological ‘computations’ are difficult to study because the tools to make high-dimensional measurements of dynamic protein interaction networks are lacking. Here, we use a multiplex co-immunoprecipitation approach to monitor a protein network composed of ASD-linked gene products as it undergoes homeostatic plasticity, an important form of intrinsic synaptic plasticity.
Background: Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by the presence of persistent deficits in social interaction and communication, as well as restricted social interests and repetitive behaviors. Currently, there are no therapeutics approved to treat the core symptoms of ASD. Drug discovery in this area has been hindered by a limited understanding of the biology of ASD. In addition, the heterogeneity of clinical presentation, including severity, and the limitations of the disease models make it even more challenging to develop therapies for ASD. Focusing on single-gene alterations causing ASD, such as ADNP, FOXP1, SHANK3, and DDX3X, which are among the top high-risk autism genes, is one approach that could mitigate these challenges. Furthermore, the use of translational tools, such as in-depth characterization of neurons derived from patients’ induced pluripotent stem cells (iPSCs), opens up new avenues for drug screening and discovery in order to identify pharmaceutical compounds for the treatment of ASD’s core symptoms.

Objectives: The main objective is to discover and validate drug candidates targeting functional deficits caused by genes associated with ASD. We plan to perform an in-depth and medium-throughput characterization of cellular phenotypes in human neurons generated from iPSC lines derived from ASD patients and their siblings as controls. Additionally, we aim to establish models based on known ASD-associated mutations that could be used for drug screening.

Methods: To develop in-depth high-content phenotypic characterization in human ASD in vitro models, we established and optimized protocols to study neuronal morphology and electrophysiology features. Our method involves large-scale generation of mature glutamatergic neurons using the Ngn2-mediated differentiation protocol. For morphology, neurons are stained with a neuronal marker (MAP-2) and neuronal shape is measured by a High-Content Screening (HCS) Platform in an automated and simultaneous way. For electrophysiology, multielectrode array (MEA) technology is used to measure neuronal activity during neuronal maturation.

Results: We have applied our high-content characterization approach to describe neuronal morphology and activity for the establishment of phenotypes associated with SHANK3 mutations. Differentiated neurons from three Phelan-McDermid (PMS) patient-derived iPSC lines with three different SHANK3 mutations were compared with their respective siblings. Preliminary results of cell body measurements, neurite number and neurite length identified trends towards reduced neurite outgrowth SHANK3 deficient neurons. Moreover, preliminary analyses of neuronal networks in neurons from PMS patients suggested a trend of decreased activity in two of the SHANK3-mutants. We observed variability among differentiations and cell lines. To tackle this, we are currently optimizing the differentiation protocol by generating stable patient-derived iPSCs with an integrated dox-inducible Ngn2.

Conclusions: Identification of morphological and electrophysiological changes caused by mutations associated with monogenic ASD represent a powerful tool to describe models of ASD that can be used as a platform for drug screening and evaluation. Our approach of modeling ASD with human neuronal cultures offers a platform that can be used to describe the effects of ASD associated mutations. This provides a great opportunity to identify molecules with therapeutic potential, contributing to the intense research efforts to develop pharmacological treatments for ASD.
**Background:**

The microbiota-gut-brain axis has been recently recognized as a key modulator of neuropsychiatric health and its dysregulation might be significantly implicated in the aetiology and/or symptomatology of Autism Spectrum Disorder (ASD). Microbiota alterations and gut inflammation are linked with behavioral symptoms. The benefit of deriving probiotic candidate strains from fermented foods seems strategic to develop functional foods for a personalized dietary intervention in ASD. 

*Lactiplantibacillus* (*Lpb.* *plantarum*) is one of the most versatile and robust dominant species in fermented foods, is considered safe for humans and is included in the Qualified Presumption of Safety (QPS) list of the European Food Safety Authority. Mechanisms underlying host-microbiota interactions are not fully clear yet and the endocannabinoid system (ECS) could play a key role.

**Objectives:**

The aim of this exploratory study was to evaluate the suitability of selected strains of food-borne *Lpb. plantarum*, administered to a genetic animal model of ASD, as a putative strategy to ameliorate ASD behavioral and gastrointestinal (GI) symptoms, through the involvement of the ECS.

**Methods:**

A total of 18 male mice 9-weeks old, either wild type (WT) or Neuroligin-3 R451C knockin, was fed with *Lpb. plantarum* strains for five weeks starting from weaning. Behavioral studies, elevated plus maze and marble burying tests, were used to assess whether the administration of *Lpb. plantarum* could ameliorate the anxious and obsessive-compulsive behavioral characteristics. Following behavioral testing, mice were euthanized and gastrointestinal regions and blood were immediately collected. The mRNA levels of all endocannabinoids (eCBs) metabolic enzymes and cannabinoid receptors (CBR), as well as Zona occludens-1 (ZO-1) and tight junctions were determined by RT-qPCR in colon samples. Levels of the two major eCBs, anandamide (AEA) and 2-arachidonoylglycerol (2-AG), and the endocannabinoid-like mediator, palmitoylethanolamide (PEA), were measured in plasma samples through UPLC/MS-MS.

**Results:**

Although treatment did not induce significant changes in behavioral profile (probably because of limited sample size so far obtained), molecular data indicate a clear modulation of ECS following *Lpb. plantarum* treatment. In particular, 2-AG content (but not AEA and PEA) and the expression of type-2 CBR gene (main target of 2-AG) as well as of claudin 1, claudin 3 and ZO-1 gene (involved in gut mucosal structure maintenance and permeability) were restored at the WT levels in ASD mice nourished with *Lpb. plantarum*. Consistently, the mRNA levels of MAGL, 2-AG hydrolyzing enzyme, resulted downregulated in the same animal group.

**Conclusions:**

Overall, our findings provide evidence of an effective cross-talk between functional microorganisms and ECS in a mouse model for the study of ASD. These encouraging results underline a potential implication of the host-microbe interaction in terms of alleviation of ASD-GI symptoms, opening the way to human clinical trials in order to develop functional foods that can vehicle specific probiotic strains directly isolated from fermented foods.
Objectives:

Our overarching objective is to develop a novel scalable high-throughput platform to quantify the morphological effects of CRISPR-based transcriptional repression (CRISPRi) in multiple ASD-risk genes simultaneously in human neurons. Thus, we aim to 1) develop neuronal cell-filling optical cellular barcodes linked to CRISPR perturbations that can be identified using immunofluorescence; 2) optimize cyclic immunofluorescence enabling the analysis of morphometric signatures caused by multiple perturbations in a pooled format; and 3) identify common cellular and molecular phenotypes of ASD-risk genes to uncover convergent mechanisms.

Methods:

We cloned different combinations of 3 linear epitopes as protein barcodes (Pro-Codes) fused to a neuron-filling scaffold protein coupled with individual targeting single guide RNAs (sgRNAs) for CRISPRi perturbations. We designed Pro-Codes using unique triplet combinations of 6 epitopes for 8 ASD risk genes along with a positive control and non-targeting negative control in duplicate. We packaged these 20 Pro-Codes in lentivirus individually and then pooled them. We delivered this pool to induced pluripotent stem cells (iPSCs) at a low multiplicity of infection, such that each cell received only 1 Pro-Code. Using Ngn2 overexpression, we differentiated these cells into induced neurons (iNeurons) and used antibiotics to select for Pro-Code expressing cells. Cells were then fixed and stained for 3 epitopes for immunofluorescence imaging. Fluorophores were then bleached, and cells were re-stained with antibodies against the remaining 3 epitopes for neurite tracing. This was followed by another round of bleaching and staining with antibodies against synaptic markers. We quantified neuronal morphology and synaptic markers in thousands of iNeurons for each ASD gene perturbation using CellProfiler.

Results:

We validated 10 epitopes, allowing us to create 120 unique Pro-Codes for barcoding and neurite tracing. We then successfully performed 3 rounds of bleaching and re-staining of epitopes in these iNeurons without damaging the epitopes or cells. Furthermore, we benchmarked our high-throughput pooled assay against conventional arrayed knock-down of the same genes. Finally, we analyzed the effects of knock-down of 8 autism-risk genes and observed striking changes in neuronal survival, axonal and dendritic arborization, and synaptogenesis.

Conclusions:

We have established POINT-MAP as a novel mid-throughput CRISPRi platform to study the effects of knock-down of ASD-risk genes on neuronal morphology. Our protein barcoding strategy enables the study of the morphological effects of multiple ASD risk genes at once. Our technology facilitates the discovery of convergent mechanisms across ASD risk genes which could inform targets for broadly applicable therapeutics.

417.329 (Poster) Ex Vivo Exposure to Polybrominated Diphenyl Ether Selectively Affects the Immune Response in Children with ASD

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Background: Children with autism spectrum disorder (ASD) have immune dysregulation that often correlates with behavioral deficits, and it is thought that the post-natal environment affects immune function.

Objectives: To examine the association between plasma levels of polybrominated diphenyl ether (PBDE) and immune cell function in age-matched children with and without ASD.

Methods: Plasma from children with (ASD; n=38) and controls (TD; n=60) were analyzed for 14 major PBDE congeners by mass spectrometry. Cytokine/chemokine production was measured in peripheral blood mononuclear cell (PBMC) supernatants with and without ex vivo BDE-49 exposure using multiplex analysis for IFN-γ, IL-1α, IL-1β, IL-2, IL-4, IL-6, IL-10, IL-12 (p40), IL-12 (p70), IL-13, IL-17, MCP-1, MIP-1α, MIP-1β GM-CSF and TNF-α.

Results: Total plasma concentration (Σ PBDE14) and individual congener levels were also correlated with T cell function. Σ PBDE14 did not differ between diagnostic groups but correlated with suppressed immune function in ASD. Higher Σ PBDE14 levels also negatively correlated with adaptive T cell cytokine production following activation of PBMC. Baseline production of IL-2 and IFN-γ were reduced by several individual BDE congeners in ASD compared to TD, especially BDE-49 (p<0.001). ASD PBMC exposed ex vivo to 50 nM BDE-49 produced elevated levels of IL-6, TNF-α, IL-1β, MIP-1α and MCP-1 (p<0.05). Finally, increased IL-6 (p=0.01) and GM-CSF (p=0.03) following ex vivo exposure to 250 nM BDE-49 was positively correlated with higher plasma BDE-49, but not BDE-47 or BDE-95, in ASD vs TD.
Conclusions:

Despite similar plasma levels of PBDE, ex vivo exposure differentially impacted immune cell function in cells from subjects with ASD compared to TD control suggesting an underlying association between susceptibility to PBDE exposure and immune anomalies in children with ASD. These findings highlight the need to include cellular functional exposure studies when examining the effects of toxicant exposure in a study population.

417.330 (Poster) Folic Acid Supplementation or Depletion Alters Cortical Neurodevelopment and Neuron Maturation; Implications for Neurodevelopment.

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Background: Optimal folate levels during early pregnancy can reduce the risk of neural tube defects. However, there is concern about inadequate folate intake as a result of consuming higher doses of folic acid (FA) with potentially minimal additional benefits, and excessive intake may be associated with neurodevelopmental risks.

Objectives: To determine the effects of FA depletion and supplementation on the functionality and neuronal development of hiPSC-derived neural precursor cells (CRTD5-NPCs) and during differentiation of cortical neurons.

Methods: The cytotoxicity of FA dose was assessed before and after exposure to eight different concentrations of FA gradients (0 - 1000 uM). Three different concentrations of FA were administered to NPCs and differentiated cortical neurons: 1) FA normal (FN) (2.27 uM; the concentration used in the manufacture of neuronal medium), 2) FA deficient (FD) (no FA), and 3) FA oversupplementation (FO) (1000 uM at the NPC stage and 100 M during eight weeks of cortical differentiation). Elecsys Folate III was used to measure intracellular folate levels. FACS was used to evaluate cell viability and apoptosis. Four points of analysis were used in this study: week 0 (W0), which represents NPCs after five days of treatment, and weeks 3, 6 and 8 (W3), which represent differentiated cortical neurons. Across each time frame, quadruplets were compared with corresponding controls. Neurobasal Medium was used to differentiate hPSC-derived NPCs into cortical neurons. To assess neuronal function, VGCCs and whole-cell patch clamp electrophysiology were used. IHC staining was performed to detect mature neuron markers and cortical neurons (MAP2, NeuN, TBR1, CTIP2, BRN2, SATB2, Synaptophysin and phosphorylated-neurofilament-H). The expression of genes and proteins was analyzed using RNA-seq and proteomics techniques.

Results: The preliminary results indicate that FD and FN cells showed similar proliferation and viability during the NPC stage, as well as during the early stages of cortical differentiation. FD cells began to apoptose at W6 and detached from the laminin-coated wells. When FO cells were supplemented with excess FA, they displayed an increase in proliferation at the NPC stage. FD and FO differentiated neurons, however, exhibited an increase in apoptosis at W6. Both FA deficiency and abundance enhanced apoptosis at W6 by adapting different mechanisms. Calcium imaging of individual cells is an indirect indicator of neural activity, which measures changes in intracellular calcium levels. According to the VGCC results, cells differentiated into neurons after W3 and responded to the KCL stimulus with no difference between groups. As a result, neural activity is similar regardless of FA status. According to the patch clamp results, by W6, FO significantly increased the percentage of neurons generating action potentials compared to their respective controls. The presence of neuronal markers was confirmed by immunohistochemistry.

Conclusions: In the context of mandatory FA fortification, preliminary evidence indicates that FA intake below and above the physiologic dose alters neuronal maturation. All supplements should be carefully monitored to prevent toxicity and hypervitaminosis. We are validating our findings and more research should be conducted to examine the nutritional disparities at each stage of pregnancy in greater detail.

417.331 (Poster) From Rare Mutations to Common Pathways in ASD

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Background:

The latest exome-wide association study in neurodevelopmental disorders identified over 350 genes that harbor mutations strongly contributing to the risk for autism spectrum disorder (ASD) and developmental delay. To translate these findings into eventual therapeutics, we first need to investigate the functions of each of these genes and their mutations in the context of brain development. Studying each of these genes separately in animal or cell models is a daunting task. As an alternative to traditional approaches, we have implemented a high-throughput method to study the functions of multiple ASD risk genes in disease-relevant human neuronal cells.

We have coupled CRISPR-Cas9 transcriptional repression (CRISPRi) to single-cell RNA sequencing (scRNA-seq) to enable high-throughput perturbation of multiple ASD risk genes at once with a parallel functional readout of the transcriptional consequences. Here, we...
have used this technology to extract functional signatures for 77 of the top ASD risk genes in human neural progenitor cells and neurons derived from induced pluripotent stem cells (iPSCs).

Objectives:

We sought to identify transcriptional and functional signatures for each of 77 high-confidence, large-effect ASD risk genes in human neural cells. Next, we sought to compare signatures across genes to discover shared mechanisms of ASD risk genes. We also examined the functional impact of ASD gene repression on cell fate specification of neural progenitor cells and on the trajectory of neuronal differentiation. Finally, we sought to discover ASD risk genes with shared gene expression signatures.

Methods:

We differentiated human iPSCs into neural progenitor cells and performed CRISPRi of 77 ASD risk genes. We collected scRNA-seq data from ~60,000 cells across 2 biological replicates to identify transcriptional signatures of ASD risk genes. Using dimensionality reduction followed by clustering, we identified neural cell types. We tested for alterations in cell-type proportions caused by ASD risk gene knockdown. Next, we used pseudotime analysis to determine the effects of ASD risk genes on neural differentiation. To identify convergent signatures of ASD risk genes, we clustered ASD risk genes by the similarity of co-expressed gene modules.

Results:

We achieved effective knockdown for at least 60/77 target genes in iPSC-derived neural progenitor cells. Interestingly, we identified several ASD risk genes that altered cell fate specification when repressed. Several ASD risk genes pushed neural progenitor cells to adopt glial fates. Furthermore, we identified multiple ASD risk genes that altered neural differentiation, including some that accelerated or delayed this process. Finally, we found that ASD risk genes clustered by shared co-expression modules, indicating shared signatures.

Conclusions:

We have demonstrated a high-throughput platform to evaluate the effects of ASD risk genes on human neurodevelopment. Our approach enables the discovery of transcriptomic and functional consequences of ASD risk gene perturbation in human neural cells in a cell-type-specific manner. We have identified potential convergence across ASD risk genes on cell fate specification, neuronal differentiation, and gene expression signatures. Overall, these results improve our knowledge of ASD risk gene mechanisms, pinpoint commonly disrupted pathways, and nominate targets for future therapeutic intervention.

**417.332 (Poster) Genome-Wide Screen for Genes Essential for Neuronal Differentiation and Their Association with ASD**

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**Background:**

The genetics of autism spectrum disorder (ASD) is very complex and with large genetic heterogeneity. The search for de novo and rare variants in ASD resulted in more than a hundred genes significantly associated with ASD. With large genetic heterogeneity, it is important to identify convergent pathways and molecular mechanisms that explain how mutations in so many genes contribute to the disorder. Enrichment analyses have revealed that ASD risk genes are involved in neuronal differentiation, synaptic activity, and, most notably, chromatin and transcription regulation. These chromatin regulators may contribute to multiple molecular processes, and several recent studies have suggested that they can direct neural progenitor cells (NPCs) toward proliferation and differentiation.

**Objectives:**

This study aims to identify shared mechanisms for ASD genes and their involvement in neuronal differentiation.

**Methods:**

To perform a genome-wide screen for genes that influence neuronal differentiation, we used CRISPR pooled libraries to knockout almost all genes in the genome. The screen was performed using mouse embryonic stem cells. Each cell in the culture carries a distinct genetic manipulation based on the single guide RNA (sgRNA) introduced into the cell. The cells were differentiated into NPCs and later into neurons. In some cells, the sgRNAs deaktivate a gene essential for proliferation or differentiation and confer an advantage or disadvantage. Thus, the readout in this experiment is the abundance of sgRNAs. Targeted sequencing was used to compare the levels of sgRNAs at different stages of neuronal differentiation and to reveal the genes whose loss offers a growth advantage (positive selection) or disadvantage (negative selection).
Results:

We identified 2554 significant genes whose loss is positively or negatively selected during neuronal differentiation. Those genes were more likely to be intolerant to mutations and associated with brain size and neurodevelopmental disorders. The genes whose loss offered growth advantage were associated with enlarged brain size. Based on the dynamics of the sgRNAs during the differentiation process, we separated the genes into eight different clusters. Multiple clusters were associated with neurodevelopmental disorders and changes in brain size, but only one cluster was enriched with ASD genes.

Conclusions:

We identified multiple genes that are new candidates for being risk factors for neurodevelopmental disorders and found functional convergence of ASD genes by studying the essential genes during neuronal differentiation. Our results support the hypothesis that deficits in the proliferation and differentiation of NPCs lie at the heart of ASD pathology.

417.333 (Poster) Hnmpu Expression Affects Transcriptional Programs and Chromatin Organization during Neuronal Maturation

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Background: HNRNPU (Heterogeneous nuclear ribonucleoprotein U) protein is known to regulate interphase chromosome structure, transcription, and alternative splicing. Recently, it was shown that the downregulation of HNRNPU expression affects 3D genome organization. Pathogenic genetic variants affecting HNRNPU located on chr1q44 have been shown to cause HNRNPU-related developmental syndrome, including autism spectrum disorder (ASD), seizures, intellectual disability (ID), and developmental delay. The role of HNRNPU in neural development and the biology behind the associated phenotypes caused by the genetic variations have not yet been characterized.

Objectives: We aimed to discover the effects of HNRNPU deficiency during early neural development and connect these changes to biological processes behind ASD and other neurodevelopmental disorders. Specifically, we focused on the impact of HNRNPU deficit on transcriptome and chromatin organization.

Methods: Fibroblasts, used for the formation of induced pluripotent stem cells (iPSC), were donated by neurotypical controls and individual diagnosed with ASD and carrying a heterozygous deletion of ~44.3Kb that involves HNRNPU, COX20, and antisense HNRNPU1, hereby called HNRNPUdel cells. iPSC-derived neuroepithelial stem (NES, D0) cells and undirected neural differentiation for 28 days (D28) were used for this project. In parallel, siRNA experiments on control cells have been performed. The neural maturation trajectory was evaluated by assessing the percentage of neural progenitor and dividing cells at D28 by immunofluorescence and BrdU assay. Both bulk RNA and Hi-C sequencing were performed to evaluate the transcriptomic and chromatin organization differences in HNRNPU deficiency states.

Results: Transcriptome analyses illustrated that at D28, chromatin organization and cell division pathways are upregulated, while synaptogenic pathways are downregulated in HNRNPUdel/siHNRNPU. The transcriptome variability at D28 determined by differential exon usage was increased and overrepresented for genes previously associated with ASD, intellectual disability, epilepsy, and developmental delay. We demonstrate a significantly higher proportion of neuro progenitors and altered chromatin organization at D28 upon HNRNPU deficiency. Specifically, we showed a dramatic switch of the compartment structure, with enrichment of the inactive B compartments under HNRNPU deficiency conditions. Interestingly, the genes mapping in the compartments switching from active (A) to inactive (B) chromatin status and downregulated at the transcript level were enriched for genes implicated in ASD and epilepsy.

Conclusions: We provide the first evidence of the functional consequences of pathogenic genetic variants affecting HNRNPU in human neural progenitors in the form of an inadequate switch to neurogenesis. These results are accompanied by large-scale effects on chromatin organization and transcriptional landscape at later stages of neural development and presumably lead to diverging trajectories of maturation of neurons and other neural cells. Our results show similar biological insights that have been indicated in other ASD-associated genes to have in early neural development.

417.334 (Poster) Metabotropic Glutamate 5 Receptor Availability Differences in Twin Pairs Discordant for Autism and Controls: Do Shared Genetics Matter?

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Background:

Glutamate is the principal excitatory neurotransmitter and is important for brain development and plasticity. Evidence from post-mortem and animal studies has implicated the metabotropic glutamate receptor 5 (mGluR5) in autism spectrum disorder (ASD). Two recent positron emission tomography (PET) studies showed higher mGluR5 availability in ASD individuals compared to neurotypical controls in certain brain regions (1, 2).

Objectives:

Here, we aim not only to replicate prior findings but in addition compare mGluR5 availability in twin pairs discordant for autism. This design allows us to minimise confounding random variation in genetic and environmental factors, and isolate ASD specific variation in mGluR5.

Methods:

Seven adult twin pairs discordant for ASD (three male/four female pairs; six monozygotic/one dizygotic pair; five qualitatively/two quantitatively discordant pairs) and eight typically developed control subjects were examined with PET and radioligand 
$[^11]F$FPEB binding to mGluR5. The mGluR5 binding was quantified using the simplified reference tissue model with centrum semi-ovale as reference region.

First, within-pair comparisons of mGluR5 binding were analysed using paired t-tests in only the twin pairs. Second, including all subjects, generalized estimating equation (GEE) models were run, where the standard errors are corrected for familial clustering. Finally, Pearson’s r was calculated for correlations between mGluR5 availability and ASD traits measured with social and cognitive tasks and questionnaires.

Results:

Comparing the ASD probands with their unaffected co-twins, we found no significant differences in mGluR5 availability in any brain region. Four of the probands displayed slightly higher mGluR5 binding than their co-twins whereas two of the probands displayed lower binding. The direction the difference was not associated with zygosity, sex or quantitative/qualitative discordance. The GEE regression models revealed no statistically significant differences between the probands and their co-twins for any brain region. For the neurotypical control subjects, mGluR5 receptor availability was significantly lower than the ASD probands in most brain regions (B-coefficient between -0.3 and -2.1, p-values ranging from 0.001 to 0.049). No significant correlations were found between ASD behavioural traits and mGluR5 availability (Pearson’s r ranging from -0.35 to 0.25).

Conclusions:

Our finding of lower mGluR5 availability in neurotypical control subjects compared to subjects with ASD is in line with the findings of the two previous PET studies (1, 2). However, the within-pair and GEE analysis revealed no differences in mGluR5 binding between the ASD twins and their unaffected co-twins. Using a discordant twin design, we were able to control for genetic and environmental confounders to a high degree. We also found no significant correlations between mGluR5 binding and any ASD trait or symptom measurements. Thus, our results suggest that higher mGluR5 availability is associated with genetic risk for ASD but not to the clinical phenotype display.

1. Carey C, et al. From bench to bedside: The mGluR5 system in people with and without Autism Spectrum Disorder and animal model systems. Transl Psychiatry [Internet]. 2022

Background: The Fragile X Mental Retardation Protein (FMRP) is a nucleo-cytoplasmic RNA Binding Protein that regulates translation of mRNAs, essential for synaptic development and plasticity. The loss of FMRP results in Fragile X Syndrome (FXS). FMRP interacts with a
specific set of mRNAs and regulates their translation through its association with ribosomes. But the biochemical nature of this interaction is currently undefined.

Objectives: To determine the nuclear and cytoplasmic role of FMRP-ribosome interaction in regulating neuronal protein synthesis.

Methods: Small RNA sequencing and Ribo-Meth Sequencing was performed in WT and FMR1 KO Human Embryonic Stem Cells to identify the snoRNA interactome and capture alterations in rRNA 2’O Methylation patterns. FMRP domain variants were overexpressed in rat primary cortical neurons (DIV 11) to elucidate their structural contribution in ribosome binding, protein synthesis inhibition and granule formation.

Results: FMRP-snoRNA interaction regulates 2’O Methylation on rRNA, which results in ribosomes with differential methylation patterns. In the cytoplasm, FMRP recognizes ribosomes carrying specific methylation patterns on rRNA and the recognition of methylation pattern by FMRP may potentially determine the translation status of its target mRNAs. Polysome profiling and FUNCAT structurally reveals that the C-terminus domain of FMRP alone is sufficient to bind to ribosomes and inhibit protein synthesis, akin to the full-length protein. However, FMRP-mediated puncta formation is favored by the synergistic combination of FMRP domains and not by individual domains. Phosphorylation of hFMRP at Serine-500 is important in modulating the dynamics of translation by controlling ribosome/polysome association. This is a fundamental mechanism governing the size and number of FMRP puncta, which appear to contain actively translating ribosomes. Experimental data with patient identified FMR1 mutations describe a hierarchy in the contribution of FMRP domains in translation regulation

Conclusions: FMRP both influences the generation of ribosomes bearing a distinct 2’O-Methylation pattern on its rRNA component and also recognizes that pattern. FMRP exhibits a ranking in the functionality of its domains in cellular mechanisms leading to translation regulation. The C-terminus domain of FMRP is essential and sufficient enough to bind to the ribosome to regulate translation inhibition and this function is modulated by its phosphorylation status. On the contrary, the KH domains are essential for puncta formation, a mechanism that precedes ribosome binding.

417.336 (Poster) SHANK3-Catenin Interaction and the Clinical Features of Phelan-Mcdermid Syndrome
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Background:

SHANK3 gene encodes a large scaffold protein that are essential for synaptic development, located at the core of postsynaptic density. Haploinsufficiency of the SHANK3 gene is causally linked to Phelan-McDermid syndrome, which is characterized by moderate to profound intellectual disability (ID), severely delayed or absent speech and autism spectrum disorder (ASD). Recently results indicate and epigenetic roll of SHANK3 either directly or indirectly, mediated by nuclear location of b-catenin (codified by CTNNB1 gene), principal effector of Wnt signaling. Shank3 are responsible for sequestering b-catenin at post-synaptic site and as a consequence, heterozygous loss of Shank3, allows for increased translocation of b-catenin to the nucleus where it may induce transcription of responsive genes. There are still unanswered issues regarding how the Shank3/b-catenin relationship operates and if changes in it might affect clinical variance. An atypical case of PMS with IQ within the normal range and mild autistic characteristics were reported by us (doi: 10.1186/s11689-019-9273-1). Exome sequencing revealed a missense variant (p.V424I) at CTNND2 gene, responsible for codified delta-catenin protein, also a protein of the catenin family associated with b-catenin nuclear translocation and recently founded like a direct interaction partner of Shank3 at post synaptic density.

Objectives:

Our main goal is to evaluate if the variant found in CTNND2 could modulate the expression and localization of nuclear beta-catenin and interaction with SHANK3, leading to the less severe PMS clinical phenotype. Our hypothesis is that this variant could decrease the amount of nuclear beta-catenin, and as a consequence, maintain the expression of genes responsive to it.

Methods:

To evaluate the impact of this variant in a neural model, we used cortical neurons derived from induced pluripotent stem cells (iPSC) from PMS atypical patient, two PMS patients and three healthy controls. We analyzed expression of cortical neurons markers, and also CTNNB1, CTNND2 and SHANK3.

Results:
The samples were characterized using specific neural markers, and all of them had the expected profile according to the cell type analyzed. All PMS patients showed reduced expression of SHANK3 in relation to controls. It was not observed difference in CTNNB1 expression among samples, but clearly the atypical patient shows a reduction in CTNND2 expression in relation to other patients and controls.

Conclusions:

Our preliminary results suggest that the CTNND2 variant may interfere in protein function and might be related with a less severe phenotype, but more experiments are needed. We expect that our study will contribute to a better management and therapy in neurodevelopmental disorders. This work is being performed in collaboration with PMS Brazilian association.

417.337 (Poster) The PTCHD1 Gene, Associated with ID and ASD, Is a Regulator of Cytoskeleton Remodeling at Synapse

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Background: Neurodevelopmental disorders (NDDs) are prevalent neurodevelopmental conditions with enormous burden for patients and families and without effective treatment. Deleterious mutations in the PTCHD1 (Patched domain containing 1) gene have been described in male patients with X-linked ID (Intellectual Disability) and ASD (Autism Spectrum Disorders) and might account for up to 1% of diagnoses in males. We have used neurobiology and molecular biology techniques, applied to mouse models, to discover that genetically deleting Ptchd1 in mice affects the synaptic transcriptome and impairs synaptic structure and activity, leading to cognitive dysfunction, motor disabilities and hyperactivity (Ung et al., Mol Psy, 2018). We also described that PTCHD1 can bind to scaffolding proteins of the postsynaptic density, PSD-95 and SAP102 through a PDZ-binding motif at the C-terminal intracellular end of PTCHD1. Recently, we analyzed 13 missense variants in the PTCHD1 gene (Halewa et al, Human Mut, 2021) causing alteration of its membrane subcellular localization and leading to ASD and ID in patients.

Objectives: The objective of the study is to further understand the molecular and cellular role of PTCHD1 at synapse, as well as the pathological impact observed in male patients with ASD and ID.

Methods:

To dissect the molecular mechanisms allowing PTCHD1 receptor interactions at synapse, we performed co-immunoprecipitation and GST pull down interaction assays using purified synapses (synaptosomes) lysates from mouse cortices, and proximity ligation assay and immunocytochemistry on hippocampal primary neurons. We also evaluated the impact of Ptchd1 deletion in our Ptchd1 KO mouse model using Mass-spectrometry analysis of the synaptic proteome. To continue our characterization of PTCHD1 candidate missense variants in NDD, we studied protein expression and subcellular localization in HEK293T cell line and in mouse hippocampal primary neuronal cultures.

Results:

We determined that the C-terminal region of PTCHD1 independently of its PDZ-binding motif, interacts with Rac1, a RhoGTPase essential for cytoskeleton activity and remodeling, and synapse plasticity. The Mass-spectrometry analysis highlighted, in Ptchd1 KO mice, a decreased expression of proteins acting in pathways regulating actin cytoskeleton, RhoGTPase and translation and an increase in proteins involved in translation initiation and cellular metabolism. By overexpressing PTCHD1 novel missense variants in HEK293T cells, we demonstrate the pathogenicity of several variants either by decrease in protein expression or by difference in subcellular localization in cell line or at dendritic spines in mouse hippocampal neurons.

Conclusions: Highlighting PTCHD1 novel interacting partners and PTCHD1 missense mutations functional impact will allow a better understanding of those neurodevelopmental disorders and give potential answers to patients and families.

417.338 (Poster) The Role of Ciliogenesis, Rfx-Factors and Their Genomic Binding Sites in Autism and Neurodevelopment

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Background:

The cilium is a unique organelle that protrudes from cellular surfaces as a hair-like structure containing a microtubule core and a specialised ciliary membrane. Within the brain, non-motile primary cilia are found on most cell types and are essential to proper brain patterning, neurogenesis, and neural migration. Neurodevelopmental differences and cognitive difficulties are also common features of genetic ciliopathy disorders where ciliogenesis and cilia function are disrupted. Members of the RFX transcription factor family, which
regulate ciliogenesis gene networks, are essential for proper cilia formation and knockout of RFX factors causes neurodevelopmental defects in mice. Recently, RFX3 was implicated as a candidate gene for autism following the identification of damaging, rare de novo and inherited variants in RFX3 in four separate studies.

**Objectives:**

Although ciliary function is critical for normal brain development, the role of cilia in Neurodevelopmental Disorders remains unexplored. Symptomology of ASD, however, overlaps with ciliary-related disorders and rare RFX3 variants found in ASD cases suggest that disruption of gene networks regulating ciliogenesis may contribute to the development and pathogenesis of ASD. We, therefore, aim to determine the effects of RFX3 loss-of-function on neurodevelopment and neural function in human models and explore the potential role of RFX target genes in the etiology of ASD through analysis of X-box promotor motifs.

**Methods:**

We have introduced both heterozygous and homozygous RFX3 loss-of-function mutations in human induced pluripotent stem cells (hiPSCs) using CRISP/Cas9 gene editing technology. Utilising various molecular and cellular analysis, we are examining effects of RFX3 variants in hiPSC-derived neuronal models alongside isogenic controls. Bioinformatics approaches are also being employed to characterise RFX target genes and examine variants in X-box motifs.

**Results:**

Our preliminary analyses found that homozygous RFX3 loss-of-function results in reduced length of the cilium in human neural progenitors. Additionally, both homozygous and heterozygous RFX3 mutation led to decreased activation of the ciliary signalling pathway, Shh, and a substantial increase in the rate of progenitor proliferation. Of interest, we found that risk genes for ASD, Schizophrenia and Neurodevelopmental Disorders more broadly, are enriched for X-box promotor motifs. Comparison with expression data also highlighted genes containing X-box motifs are expressed in relevant cell types during early neurodevelopment, including neuronal populations and intermediate progenitor cells.

**Conclusions:**

While our initial results indicate a significant effect of RFX3 mutation in human neural progenitor function, we are currently further examining effects in additional hiPSC-derived in vitro models including 2D differentiating neurons and 3D cortical organoids. We are also exploiting large-scale ASD genomic data from thousands of cases to explore non-coding variants occurring in X-box motifs. Our study will provide novel insight into the functional causes of ASD and the role of cilia in neurodevelopment and cognition, an area that is currently largely under investigated.

417.339 (Poster) Uncovering the Contribution of SPTBN1 to Neurodevelopment and Autism Using Cellular and Mouse Models

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**Background:** βII-spectrin, encoded by *SPTBN1*, is an essential component of the cytoskeleton across all cell types in the nervous system. Tetramers of βII-spectrin and its partner αII-spectrin assemble to crosslink actin filaments to form a periodically organized scaffold that lines the neuronal membrane. The submembrane spectrin network provides mechanical support to membranes, organizes critical membrane proteins into specialized signaling and excitable domains, and promotes organelle transport in neurons. We recently reported de novo *SPTBN1* variants as the genetic cause of a global developmental delay (DD) syndrome that is comorbid with intellectual disability (ID), autism spectrum disorder (ASD), and epilepsy. We found that mouse models of βII-spectrin haploinsufficiency or total loss in the brain recapitulate DD, hyperactivity, social deficits, and brain anatomical changes observed in affected individuals, which supports a loss of function mechanism. However, our new preliminary findings suggest that a group of *SPTBN1* variants within the actin-binding domain operate through gain of function mechanisms likely to impact cytoskeletal organization and synaptic function.

**Objectives:** By combining studies in knock-in mouse lines and patient induced pluripotent stem cell- (iPSC) derived neurons that harbor heterozygous *SPTBN1* variants relevant to ASD and DD, we aim to identify robust phenotypes that are reproducible across these experimental systems. Our goal is to gain mechanistic insights into cell type vulnerability and specific effects of variants that increase risk for ASD.

**Methods:** We developed a screening platform to mechanistically interrogate *SPTBN1* variants via behavioral, live cell and super-resolution microscopy, ‘omics, and electrophysiological studies. This system combines complementary studies in knock-in mice bearing disease variants with potential gain of function effects, and neurons differentiated from patient iPSCs bearing the same variants and their isogenic controls.
Results: We identified that a subset of \textit{SPTBN1} variants that cause ASD, ID and DD alter the interactions of βII-spectrin with F-actin and other critical components of the neuronal cytoskeleton, often leading to their accumulation within cytosolic aggregates. Through biochemical and imaging studies conducted in brain preparations and primary neuronal cultures from knock-in mice and in iPSC-derived neurons, we determined that βII-spectrin deficits altered the organization and macromolecular composition of axonal and dendritic domains required for proper synaptic excitability. Our transcriptomics and proteomics findings point to novel and convergent mechanisms that implicate βII-spectrin in the regulation of ion channel function.

Conclusions: We report the first functional evaluation of ASD-linked \textit{SPTBN1} variants predicted to operate via dominant effects both in vivo and in human neurons. Our findings uncovered deficits in βII-spectrin stability, in its interaction with critical cytoskeletal partners, and in synaptic function as convergent pathological mechanisms shared across all variants. We will also discuss our findings from mouse models that add insights into cell type vulnerability and disease progression, which will inform the design of therapies targeting specific mutant alleles and convergent pathology.

Sensory, Motor, and Repetitive Behaviors and Interests

PANEL DISCUSSION — SENSORY, MOTOR, AND REPETITIVE BEHAVIORS AND INTERESTS

201 - Advancing Understanding of Repetitive Behaviours: From Nosology and Assessment to Neurobiology to Treatment

Panel Chair: Mirko Uljarevic, Melbourne School of Psychological Sciences, Faculty of Medicine, Dentistry and Health Sciences, University of Melbourne, Parkville, VIC

Discussant: Thomas Frazier, Psychology, John Carroll University, Cleveland, OH

Despite the centrality to autism diagnosis and significant impact on autistic individuals and their families, critical gaps remain in our understanding of the restricted and repetitive behavior (RRB) domain. Most pressingly, our field has been faced with inconsistencies in the conceptualization and measurement of RRB, a lack of robust and replicable insights into the neurobiology of RRB, and lack of effective, targeted intervention and support approaches. The proposed panel brings together state-of-the-art measurement, genetic and treatment-related empirical work aimed at advancing the science and clinical management of RRB. Proposed investigations span a range of approaches including (i) new, open-source, comprehensive, quantitative assessment developed and validated through a combination of meta-analytic and big data approaches, (ii) largest to date investigation of the genetic architecture of specific, well-defined RRB subdomains, (iii) randomized controlled trial (RCT) of a novel parent group intervention for managing RRB, and (iv) multicentre RCT to evaluate the effectiveness of tDCS for reducing specific RRB. By integrating novel measurement and computation approaches, the latest insights into underpinning neurobiological mechanisms, and advances in terms of novel and effective, diverse treatment options, the proposed panel is particularly timely and holds promise for positively impacting both research and clinical practice.

201.001 (Panel Discussion) Combining Meta-Analytic and Big Data Approaches to Develop and Validate a New Quantitative Measure of Restricted and Repetitive Behaviors

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Background: Inconsistencies in the organization, division, and measurement have pervaded the restricted and repetitive behaviors (RRB) research to date. Although several well-researched RRB instruments exist, they have been limited by poor (i) domain representation (e.g., capturing only certain subdomains and not others) and coverage (e.g., only a few items per subdomain), (ii) psychometric properties, and (iii) ability to capture subtle symptom expressions and track change. Noted measurement limitations have stifled progress in the RRB research and clinical field. Thus, new instruments designed to systematically and comprehensively capture all relevant RRB subdomains using contemporary measurement development techniques and validated through state-of-the-art analytical approaches are needed to enhance insights into the clinical correlates, underpinning neurobiological mechanisms and treatment options of diverse RRB subdomains.

Objectives: To describe the development and preliminary validation of the Dimensional Assessment for Restricted and Repetitive Behaviors (DARB)—a new, comprehensive, quantitative, informant-rated measure of RRB in children and adolescents with autism.

Methods: Evidence-based taxonomy of RRB is a prerequisite for the measurement development, thus, we have utilized a cross-measurement meta-analytic approach across RRB factor analytic studies published studies to date (N= 41) to derive a robust, comprehensive, and replicable conceptual model of RRB. Identified RRB model encompassed the following 8 subdomains: repetitive...
sensory-motor behaviors (RSMB), insistence on sameness (IS), restricted interests (RI), unusual interests (UI), sensory sensitivity (SS), self-injurious behaviors (SIB), obsessions and compulsive behaviors (OCB) and repetitive language (RL).

A comprehensive set of items was developed to capture each of the eight identified RRB subdomains. Parents of 1892 youth with autism (M_{age} = 10.81 years, SD_{age} = 4.14) recruited from the Simons Foundation Powering Autism Research for Knowledge (SPARK) research match completed the DARB items, several existing RRB instruments, and measures of social and communication impairments and anxiety. A subsample of 450 parents completed the DARB items after two weeks in order to evaluate test-retest stability.

**Results:** Exploratory graph analysis conducted in the exploratory subsample (n = 921) identified eight dimensions that were aligned with hypothesized RSMB, IS, RI, UI, SS, SIB, OCB, and RL RRB subdomains. The confirmatory application of the exploratory structural equation modeling conducted in the confirmatory subsample (n = 971) showed that the derived factor structure had a good fit to the data (CFI = .932; TLI = .922; RMSEA = .044; SRMR = .036). Model reliability was excellent across identified factors (ω ≥ .86) and item response theory indicated at least good conditional reliability from low scores (theta -1) to very high scores (theta +3) for all DARB subscales. Two-week test-retest stability was excellent (ICC ≥ .89) and generalized additive modeling demonstrated that DARB subscales showed a distinct pattern of associations with key demographic, cognitive, and clinical correlates.

**Conclusions:** DARB will be useful in a variety of research and clinical contexts considering the prominence and clinical impact of RRB in ASD. The strong preliminary evidence indicates that the new scale is comprehensive and captures a wide range of distinct RRB subdomains not simultaneously captured by any of the existing instruments.

**Background:** Recent large-scale consortium-led genetic studies of autism, including exome sequencing and genome-wide association studies (GWAS) have identified over a hundred genes and genetic loci, providing valuable new insights into underlying biology. Despite this progress, efforts to elucidate genetic mechanisms contributing to autism have been substantially hindered by pervasive phenotypic heterogeneity. Given that autism phenotypic complexity likely reflects distinct underlying neurobiological mechanisms, it has been reasoned that focusing on more precisely defined symptom domains could increase the power to detect specific genetic influences. The examination of the restricted and repetitive behaviors (RRB) domain has been suggested as a promising approach for reducing genetic heterogeneity, however, previously reported findings of potential RRB-associated loci have not been replicated. The major obstacle for robust and replicable identification of genetic mechanisms of RRB, aside from the limited sample sizes, has been a lack of clarity around the structure and conceptualization of RRB. We propose that integration of large samples with advanced latent variable approaches to establish consistent and generalizable RRB structures for each domain across existing instruments represents a promising avenue for research aimed at understanding the genetic basis of variation in RRB.

**Objectives:** The current investigation aimed to utilize single- and multi-measurement RRB factor scores derived across the most commonly used general autism severity and dedicated RRB measures as quantitative traits to investigate genetic architecture of specific, well-defined RRB subdomains.

**Methods:** Confirmatory application of exploratory structural equation modelling (ESEM) was utilized to derive single- and multi-measurement RRB factor scores across from the Autism Diagnostic Interview-Revised (ADI-R), the Social Responsiveness Scale (SRS-2) and the Repetitive Behavior Scale-Revised (RBS-R) measures available in the Simons Simplex Collection (SSC), Autism Genetic Resource Exchange (AGRE) and Simons Foundation Powering Autism Research (SPARK) cohorts (total N = 20,612). Derived RRB subdomain scores were utilized as inputs in genetic studies, including GWAS (i.e. analysis of common genetic variation). For each GWAS, we further calculated SNP heritability and genetic correlation using LD score regression and ran gene-based analysis using MAGMA. We constructed polygenic risk scores (PRS) from autism or autism-related GWAS using PRS-CS and explored the association between PRS and endophenotypes.

**Results:** GWAS identified a total of seven SNPs surpassing genome-wide significance (GWS, p-value < 5e-8), including 3, 2 and 2 SNPs in the SSC, AGRE and SPARK cohorts (respectively), mostly for insistence on sameness phenotypes. Importantly, there was significant (albeit modest) replication of association signals across cohorts for IS phenotypes. We identified three genes (BRDT, ZW10, SLC43A2) associated with different insistence on sameness endophenotypes, after correcting for the number of genes per endophenotype. We observed widespread positive correlations between endophenotypes and autism or autism-related PRS.

**Conclusions:** Though the combination of fine-grained, well-defined RRB subdomains and access to the largest currently existing autism genetic datasets, this study provides important knowledge of the genetic architecture of RRB. It also provides crucial insights into the...
limitations of the current measures and data infrastructure that will be necessary to further advance our understanding of the genetic basis of phenotypic heterogeneity in autism.

**201.003 (Panel Discussion) A Randomised Controlled Trial to Evaluate Clinical Effectiveness of a Parent Group Intervention to Manage Functionally Impactful Restricted and Repetitive Behaviours.**

*V. Graume* and J. Rodgers*, (1)Cambrria, Northumberland, Tyne and Wear NHS Foundation Trust, Newcastle upon Tyne, United Kingdom, (2)Population Health Sciences Institute, Newcastle University, Newcastle upon Tyne, United Kingdom*

**Background:** Restricted and repetitive behaviours are a core feature of autism, and frequently, reported by autistic people to be enjoyable, functional and helpful. However, some can be an outward sign of anxiety, cause distress or have a functional impact, causing harm to the child or restrict their access to learning or participation in their community. We have, together with parents, developed an 8 week face to face group based intervention. Managing Repetitive Behaviours (MRB) which aims to support parents to recognise, understand and learn how to respond to their child’s repetitive behaviours that can be functionally restricting.

**Objectives:** Compare the clinical effectiveness of the MRB intervention for NHS community clinical practice with psychoeducation, for the management of functionally impactful RRB in autistic children at 10, 24 and 52 weeks follow-up.

**Methods:** The study is a clinical effectiveness, multi-site randomised controlled trial of the Managing Repetitive Behaviours (MRB) parent group intervention versus a psychoeducation parent group Learning about Autism (LAA) (n=250; 125 intervention/125 psychoeducation; ~83/site) for parents of children aged 3-9 years 11 months with a diagnosis of autism. Assessments were administered at baseline, 10 weeks, 24 weeks (primary endpoint) and 52 weeks follow-up. The Learning About Autism (LAA) parent group, is equivalent to best current practice. It allows us to control for the non-specific social group benefit of mutual sharing of experience and support between parents.

**Results:** Rates of recruitment, participation and completion of follow-up assessments indicate that families found the study to be feasible and acceptable. Fidelity analysis indicated that both MRB and LAA groups were delivered with fidelity to the manual. There was no evidence of difference between the MRB and LAA parent group arms for the primary outcome measure (Clinical Global Impression-Improvement) at 24 weeks. However, analysis of the secondary outcomes indicated that children in the MRB arm compared with those in the LAA arm were more likely to be rated as responders and the impact on the family was attenuated in relation to the functionally impactful RRB identified by parents at baseline, at 10 and 24 weeks. Improvement from baseline in parental functioning (self-efficacy, stress and wellbeing) and family functioning were apparent across both intervention programmes, with no evidence of differences between the two approaches.

**Conclusions:** Our findings indicate that the MRB parent group intervention has the potential to improve the well-being of children and their families in relation to functionally impactful RRB.

**201.004 (Panel Discussion) Change in Different Dimensions of Rrb By Tdcs of Bilateral Tpj - Results of the Pilot-Iia Randomized, Controlled European Multi-Centre Study Stimat**

*C. M. Freitag*, A. Dempfle*, M. Schütz*, A. Mühlherr*, M. Siniatchkin*, J. Siemann*, M. Castelo-Branco*, F. Bonnet-Brilhaut*, C. Ricou*, M. Latimis* and C. Luckhardt*, (1)Autism Research and Intervention Center of Excellence Frankfurt, Goethe Universitat Frankfurt am Main, Frankfurt, GERMANY, (2)Institute of Medical Informatics and Statistics, Kiel University, Kiel, Germany, (3)Autism Research and Intervention Center of Excellence Frankfurt, Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, University Hospital Frankfurt, Goethe University, Frankfurt, Germany, (4)Department of Child and Adolescent Psychiatry and Psychotherapy, Protestant Hospital Bethel, Bielefeld, Germany, (5)Coimbra Institute for Biomedical Imaging and Translational Research, ICNAS, University of Coimbra, Coimbra, Portugal, (6)UMR iBrain 1253, Inserm, University of Tours, TOURS, France, (7)UMR 1253, iBrain, Université de Tours, Insérm, Tours, France, (8)Autism Research and Intervention Center of Excellence Frankfurt, Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, University Hospital Frankfurt, Goethe University, Frankfurt, GERMANY

**Background:** Transcranial direct current stimulation has been discussed as a new intervention method to improve core ASD symptoms and associated emotions and behavior. No randomised controlled trial has yet been done on TDCS stimulation of the temporo-parietal junction (TPJ), despite the central role of TPJ function in social cognition, and TPJ attenuated functioning in ASD.

**Objectives:** Here, we report the results of the StimAT study regarding feasibility, acceptability, safety, and effect sizes of change in core ASD and associated behavioral symptoms.

**Methods:** Randomised controlled, multi-centre, parallel-group phase IIa pilot study on 2mA bilateral anodal TPJ stimulation. Stimulation intensity was locally optimised to 2mA. Duration: 20min per day over 2 x 5 days. Control condition: sham stimulation. Both groups completed a computer based socio-cognitive training during stimulation.
**Results:** N=24 ASD individuals aged 10-17 years old with IQ >= 70 were included (see table 1). Feasibility was low regarding recruitment, but high for ASD individuals starting the stimulation, with 23/24 completing the 10 sessions. Acceptability was high, as were patients’ and parents’ expectations towards stimulation. No serious, and a limited number of adverse events occurred.

Regarding core ASD symptoms, effect size estimates showed a better effect of sham than tDCS on the SRS16 summary score (post intervention [T3] -0.28, 95%-CI -3.33 to 2.77; four weeks follow-up [T4] -3.16, 95%-CI -6.19 to -0.14) and RBS-R based repetitive behaviour (T3 -1.58, 95%-CI -4.39 to 1.24; T4 -0.98, 95%-CI -3.36 to 1.41), but a stronger effect of tDCS than sham on RBS-R based obsessive-compulsive behaviour (T3 1.14, 95%-CI 0.19 to 2.10; T4: 0.30, 95%-CI -1.25 to 1.84.

**Conclusions:** tDCS stimulation is well accepted by ASD patients and parents. Results of this study show that TPJ stimulation may have contrasting effects on core ASD symptoms and obsessive-compulsive symptoms in ASD.

<table>
<thead>
<tr>
<th>Table 1: Sample Description</th>
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<td>12</td>
</tr>
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<td>40.50 [39.00, 44.00]</td>
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**PANEL DISCUSSION — SENSORY, MOTOR, AND REPETITIVE BEHAVIORS AND INTERESTS**

**218 - Individual Variability in Sensory Processing and Developmental Links to Autism: Interdisciplinary Findings from Infancy to Adulthood.**

**Panel Chair:** Giorgia Bussu, *Development and Neurodiversity Lab, Department of Psychology, Uppsala University, Uppsala, Sweden*

**Discussant:** Carissa Cascio, *Department of Psychiatry and Behavioral Science, Vanderbilt University Medical Center, Nashville, TN*

Sensory processing refers to the ability to organize incoming sensory information from the surrounding environment and generate behavioural responses accordingly. Differences in behavioural responses to sensory input (i.e., sensory features), such as hypo- and hyper-responsiveness, and sensory-seeking behaviours, have been widely reported in autistic individuals, with studies providing evidence for their heterogenous manifestations across the lifespan. Yet, our understanding of the mechanisms underlying this variability and its developmental impacts within and beyond the autism spectrum remains limited. Here, we present novel findings from well-characterised longitudinal datasets spanning from early infancy to school age, adolescence, and adulthood across different interdisciplinary projects. We combine innovative methodological approaches, ranging from multivariate twin analysis and longitudinal modelling of sensory features in pediatric population-based samples, to molecular genetics, brain imaging and psychophysical measures of sensory processing in autistic individuals and neurotypical controls. Our studies highlight the relevance of studying sensory differences at different levels of investigation, integrating genetic, neurobiological and behavioural perspectives on developmental mechanisms underlying individual variability in sensory processing and how this may impact outcomes across function and symptom domains. Understanding developmental cascades linked to variability in sensory processing may provide potential targets for individualized and timely support strategies across the neurodevelopmental spectrum.

**218.001** *(Panel Discussion)* Etiological Architecture of Sensory Processing: An Infant Twin Study.

*G. Bussu*, A. M. Portugal and T. Falck-Ytter, (1)Development and Neurodiversity Lab, Department of Psychology, Uppsala University, Uppsala, Sweden, (2)Karolinska Institutet, Uppsala, Sweden

Background: Infants vary significantly in the way they process and respond to sensory stimuli. This variability is evident across the entire neurodevelopmental spectrum, with altered sensory processing being reported frequently among autistic individuals. Previous work with
adolescents and adults suggests that variability in sensory processing may have a genetic basis (Assary et al., 2021). However, we know little about the etiological factors influencing sensory differences in a critical developmental period like infancy, and its potential link to autism.

Objectives: This study investigated sensory processing profiles early in infancy with the aim to test: (1) genetic and environmental influences on individual variability in sensory processing; (2) to what extent these influences are shared or unique to different sensory domains; (3) developmental associations with later autistic traits.

Methods: We used multivariate twin models to analyse standardized parent-report scores from the Infant/Toddler Sensory Profile (ITSP; Dunn, 2002), measuring sensory processing across four quadrants: low registration; sensation seeking; sensory sensitivity; sensation avoiding. We analysed data from a community sample of monozygotic (MZ) and dizygotic (DZ) same-sex twins at 5 months of age (n=285 pairs, n=158 MZ pairs, n=150 male pairs) from the BabyTwins Study in Sweden (BATSS; Falck-Ytter et al., 2021). We selected an ACE model, estimating additive genetic (A), shared environmental (C), and nonshared environmental (E) effects, to decompose variance and covariance across the four quadrant scores, accounting for parental age and parental education covariates, across different multivariate model solutions: the correlated factors, the independent pathway, and the common pathway model (Rijsdijk & Sham, 2002). Furthermore, we used generalized estimating equations (GEE, Carlin et al., 2005) and Cholesky decomposition (Neale & Cardon, 2013) to test phenotypic and etiological associations between ITSP quadrant scores at 5 months and total scores from the Quantitative Checklist for Autism in Toddlers (Q-CHAT; (Allison et al., 2008)) at 24 months.

Results: The independent pathway model provided the most parsimonious solution to the multivariate problem, suggesting that the ITSP quadrants share common genetic and environmental influences but still represent separable constructs (see Figure 1). Shared variance ranged between 20% (sensation seeking behaviours) and 58% (sensory sensitivity), with contributions from both additive genetics and shared environmental factors. Genetic influences were overall moderate, with largest heritability for sensory sensitivity (A=0.41, CI=[0.30; 0.55]; see Figure 2), 39% of which was explained by shared genetic influences. Shared environment explained most of the variance in sensory seeking (C=0.67, CI=[0.55; 0.75]) and low registration (C=0.64, CI=[0.54; 0.74]), largely through unique factors. Contributions from unique environment were minimal. GEE associations to later autistic traits were not significant. Accordingly, Cholesky decomposition showed negligible overlap (approximately 1%) between genetic and environmental components of sensory processing at 5 months and autistic traits at 24 months.

Conclusions: This study delineates the etiological structure underlying individual variability across different sensory processing domains early in infancy. Results support Dunn’s sensory model by showing etiological separability between sensory quadrants. Findings also indicate that infants’ sensory differences do not correlate with trait-level autism later in development in the general population, neither phenotypically nor etiologically.

218.002 (Panel Discussion) The Developmental Impacts of Sensory Features on School-Age Functional Outcomes in Autistic and Non-Autistic Children

Y. J. Chen1, J. Sideris2, L. R. Watson3, E. Crais1, and G. T. Baranek1, (1)Offord Centre for Child Studies, McMaster University, Hamilton, ON, Canada, (2)Chan Division of Occupational Science and Occupational Therapy, University of Southern California, Los Angeles, CA, (3)Department of Health Sciences, University of North Carolina at Chapel Hill, Chapel Hill, NC

Background: Sensory features, including hyperresponsiveness, hyporesponsiveness, and sensory seeking/repetitions, are widely observed in but not exclusive to autistic children. While previous evidence revealed concurrent associations between sensory challenges and other behavioral domains (e.g., adaptive/maladaptive behavior) across autistic and non-autistic populations, their longitudinal associations remain unclear. A better understanding of how sensory features that emerge early in life may pose cascading impacts on children’s later functional outcomes could inform targeted and timely sensory-based intervention for those who are susceptible to later functional challenges within and beyond the autism spectrum.

Objectives: This study aimed to examine 1) the impact of sensory development from age 1 to 6 on children’s adaptive/maladaptive and participation outcomes at school age; and 2) the variances of children’s participation outcomes as explained by demographics, sensory growth parameters, maladaptive behavior, and adaptive/motor functioning in autistic and non-autistic outcome groups.

Methods: The current sample (N=1517) is a birth cohort recruited through North Carolina vital records, and was followed when children were 1, 3, and 6 years old with parent-report questionnaires (First Years Inventory-v3.1 and Sensory Experiences Questionnaire-v2.1) about children’s sensory features. School-age functional outcomes were further assessed with the Vineland Adaptive Behavior Scales (VABS-3) and Participation and Environment Measure for Children and Youth (PEM-CY) in a subset sample (N=389). The hypothesized structural equation model (Figure 1) was fitted to examine the adjusted predictive effects of latent growth parameters of sensory features on functional outcomes. The variances (R²) of distal outcome (i.e., participation level indexed by frequency and involvement for each PEM-CY activity category) explained by adding each predictor variable group (PVG1-4) were evaluated in a series of multigroup path models.
Results: The hypothesized full model fitted the data well (CFI=.987/TLI=.957, RMSEA=.027), indicating that the effects of the change rate of hyperresponsiveness on participation in home-based social/routine activities and classroom activities were mediated by adaptive functioning ($\beta=-.09$ to -.13, all $p<.05$), and by motor functioning and internalizing behavior for community-based physical activities ($\beta=-.07$ & -.06, both $p=.03$). Children’s more participation in classroom activities was directly predicted by more decrease in hyperresponsiveness ($\beta=-.34$, $p=.001$). The change rate of hyperresponsiveness was the strongest predictor of adaptive/maladaptive outcomes ($\beta=.15$ to .43, all $p<.05$). All the predictors together explained 21-49% of participation outcomes across activity categories in autistic children, as compared to 7-29% in their non-autistic peers (Figure 2). Particularly, sensory growth parameters added 3-30% variances in predicting participation outcomes across activity categories in autistic children (vs. 0-17% in non-autistic children).

Conclusions: This study examined the developmental impact of sensory features on the higher-level functional outcomes concerning what children can do and take part in within their daily lives. Early sensory features, particularly hyper- and hyporesponsiveness, may be important intervention targets for improving children’s school-age adaptive and participation outcomes regardless of autistic outcome status. However, our multigroup analysis revealed the relative importance of sensory development for predicting autistic children’s participation in certain activity categories (e.g., classroom activities). These findings highlight the potential of addressing children’s sensory needs early on for optimizing their long-term functional outcomes.

**218.003 (Panel Discussion) Tactile Sensitivity in Autism across the Lifespan: A Multi-Site Study**


**Background:** Sensory differences are common in autism, with differences in touch processing being amongst the most common. Indeed, many individuals on the autism spectrum report discomfort with regard to clothing (e.g., shirt tags and shoes), as well as interpersonal social touch. Much of the previous literature on tactile differences in autism have used informative yet inherently subjective self-report questionnaires which do not differentiate between low-level perceptual sensitivity and higher-level affective reactivity to sensory input. Psychophysical approaches can address this issue by providing robust and objective measures of the former (i.e., of perceptual sensitivity).

**Objectives:** We aimed to 1) compare tactile perceptual sensitivity thresholds between a large and wide age-range sample of individuals meeting criteria for an autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD) and typically developing controls (TDC), and 2) assess and characterize the developmental trajectory of tactile sensitivity in these groups.

**Methods:** The sample consisted of 768 participants. There were 298 autistic participants (age range = 5-27), 120 participants with ADHD (age range = 8 to 34) and 350 TDCs (age range 3-41). All participants completed a vibrotactile battery assessing reaction time (RT) and RT variability, static and dynamic detection thresholds, simultaneous amplitude discrimination with and without adaptation and temporal order judgement. The software and hardware used across sites was identical, ensuring consistency. Tactile performance was compared between the three groups using analysis of variance followed by Tukey’s post hoc tests. Exploratory non-linear normative modelling using locally estimated scatterplot smoothing was used to create a model of developmental trajectory of tactile perceptual sensitivity for all three groups.

**Results:** There were significant group differences between the autism group and TDC on most tactile tasks, as well as age-group effects, but no significant interactions, with p-values ranging between 0.045 to < 0.0001. There were also differences between the ADHD group and TDC group on the tactile tasks associated with temporal processing. Across all tasks, the ADHD and TDC groups showed similar developmental trajectories, with tactile thresholds slowly decreasing (i.e., improving) and then levelling out in early adolescence. In contrast, the autism group showed an offset in childhood, followed by a developmental delay for most tasks where tactile thresholds were substantially higher before the age of fifteen and only reached a neurotypical level after this age (Figure 1).

**Conclusions:** Here, we presented the largest psychophysical dataset in autism to date. Using data collated across five sites, we show differences in tactile perception in autism and ADHD across the lifespan. The developmental delay in autism is consistent with models suggesting alterations in brain excitation and inhibition which we previously associated with differences in touch perception. In future work we aim to compare age-related trajectories between cohorts and quantify whether deviation from the neurotypical mean correlates with clinical severity. These findings are compelling, as an apparent developmental delay in autism could have severe repercussions for social relationships and core autism symptoms, which could be crucial in informing future approaches to diagnosing and developing support for autism.
Background:
The pathophysiology of autism is still relatively unknown. The excitatory/inhibitory (E/I) imbalance hypothesis posits that imbalance between excitatory (glutamatergic) and inhibitory (GABAergic) mechanisms underlies the behavioral autism characteristics. However, whether and how E/I mechanisms differ across autism symptom profiles and brain regions is not well understood.

Objectives:
To broaden the understanding of how E/I mechanisms may differ across symptom profiles and brain regions, we investigated links between behavioural autism characteristics, genetic variance and brain structure.

Methods:
Autistic participants (n=359) and neurotypical controls (n=279) were recruited from the Aims-2-Trials LEAP (Longitudinal European Autism Project) consortium where we used behavioural autism phenotypes, genotype data and structural T1-weighted 3T-MRI scans to measure cortical thickness. We performed competitive gene-set analysis using MAGMA to investigate associations between glutamatergic ($n_{genes}=72$) and GABAergic ($n_{genes}=124$) signaling pathway gene-sets and clinical measures. We also looked at expression profiles of the genes within those sets throughout the brain and how those profiles correlate to cortical thickness differences between autistic and neurotypical participants, as well as in separate sensory subgroups.

Results:
The glutamate gene-set was associated with all autism symptom severity scores on the Autism Diagnostic Observation Schedule-2 (ADOS-2) and the Autism Diagnostic Interview-Revised (ADI-R) within the autistic group. In adolescents and adults, brain regions with greater gene-expression of glutamate and GABA genes showed greater differences in CT between autistic and neurotypical control participants although in opposing directions. This can be seen in the figure. Additionally, the gene expression profiles were associated with CT profiles in separate sensory subgroups.

Conclusions:
These analyses suggest differential roles for glutamate and GABA in the relationships between glutamate and GABA genes, and autism characteristics and brain structures. These effects may also be mediated through altered cortical thickness. Further replication and extension of this work is needed to derive more targeted treatment options for autism.
Background: According to the monotropism hypothesis (Murray et al., 2005), autism is characterized by hyper-focus on interests. Hyper-focus is also common in ADHD (Hupfeld et al., 2019). However, attention in autism and ADHD also seems more likely to be captured by distractors (Adams et al., 2019; Kuehn et al., 2019). Atypical sensory experiences are prevalent and impactful in both autism and ADHD (Ben-Sasson et al., 2019; Lane & Reynolds, 2019).

Objectives: This study tests whether hyper-focus and inattention are associated rather than opposed, and whether these attention styles are related to auditory sensory discomfort (e.g., by aversive stimuli capturing highly focused attention).

Methods: 404 adults (129 autism+ADHD, 99 ADHD-only, 87 autism-only, 89 comparison; 39% male, 49% female, 12% nonbinary/other; Mage=36.06) from online survey platforms (SPARK, Prolific, CloudResearch) screened as eligible to participate and provided usable data. Participants listened to and rated the Core Discriminant Sounds for Misophonia (MISTS-M), a psychoacoustic measure of misophonia (Enzler et al., 2021), and completed questionnaires including ASRS-18 (Kessler et al., 2005), Multidimensional Inventory of Sound Tolerance in Adults (MISTA; http://dx.doi.org/10.13140/RG.2.2.10492.28802/1), Vanderbilt Auditory Distractibility Questionnaire (VADQ; http://dx.doi.org/10.13140/RG.2.2.14831.36000), and an adapted Adult Hyperfocus Questionnaire (AHQ; Hupfeld et al., 2019). Ordinal tests were used (Kruskal-Wallis, Mann-Whitney, and Spearman correlation tests); Holm-Bonferroni corrections were applied to group comparisons.

Results: Relative to controls, all neurodivergent groups reported more AHQ dispositional hyper-focus, p’s≤.0001. Autism+ADHD and ADHD-only had more hyper-focus than autism-only, p’s≤.0003. Per Fisher’s exact test, neurodivergent groups were more likely than controls to have an intense interest, p’s≤.0003; autism+ADHD were more likely than ADHD-only, p=.01.

Neurodivergent groups had more MISTA sensory symptoms in all domains, and higher VADQ scores, than controls, p’s<.0001. Autism+ADHD reported more MISTA fear/panic than autism-only, p=.03, and more MISTA loudness/overwhelm, anxiety/avoidance, pain, and fear/panic and higher VADQ scores, p’s≤.03, than ADHD-only. After correction, neurodivergent groups did not differ in MISTA anger/misophonia. On the CDS, ADHD-only and autism+ADHD rated misophonic trigger sounds more negatively than controls, p’s≤.02, while autism-only and autism+ADHD rated pleasant sounds more negatively than controls, p’s≤.01. CDS ratings of misophonic sounds were correlated with MISTA anger/misophonia in autism+ADHD and autism-only, p’s≤.02, with weak effect sizes.

Controlling for inattention, VADQ scores were associated with dispositional hyper-focus in autism+ADHD, p=.03. Controlling for inattention, MISTA loudness/overwhelm scores were associated with dispositional hyper-focus in autism+ADHD and controls, p’s≤.002; controlling for dispositional hyper-focus, loudness/overwhelm was associated with inattention in ADHD-only and controls, p’s≤.04. Controlling for inattention, MISTA anger/misophonia scores were correlated with dispositional hyper-focus in autism+ADHD and controls, p’s≤.02; controlling for hyper-focus, anger/misophonia was associated with inattention in autism-only, ADHD-only, and controls, p’s≤.04.

Conclusions: Hyper-focus and sensory discomfort were common in neurodivergent people. As expected, phenotypes of auditory sensory discomfort were associated with hyper-focus as well as inattention, suggesting these sensory experiences at least partly reflect real-world attention allocation. Unexpectedly, hyper-focus, but not intense interests, seemed elevated in ADHD relative to autism. This could suggest hyper-focus and monotropic attention have multiple dissociable aspects. Thus, further research on characterization and measurement of hyper-focus in neurodivergent and neurotypical populations appears necessary.

Objectives: This study tests whether hyper-focus and inattention are associated rather than opposed, and whether these attention styles are related to auditory sensory discomfort (e.g., by aversive stimuli capturing highly focused attention).

Methods: 404 adults (129 autism+ADHD, 99 ADHD-only, 87 autism-only, 89 comparison; 39% male, 49% female, 12% nonbinary/other; Mage=36.06) from online survey platforms (SPARK, Prolific, CloudResearch) screened as eligible to participate and provided usable data. Participants listened to and rated the Core Discriminant Sounds for Misophonia (MISTS-M), a psychoacoustic measure of misophonia (Enzler et al., 2021), and completed questionnaires including ASRS-18 (Kessler et al., 2005), Multidimensional Inventory of Sound Tolerance in Adults (MISTA; http://dx.doi.org/10.13140/RG.2.2.10492.28802/1), Vanderbilt Auditory Distractibility Questionnaire (VADQ; http://dx.doi.org/10.13140/RG.2.2.14831.36000), and an adapted Adult Hyperfocus Questionnaire (AHQ; Hupfeld et al., 2019). Ordinal tests were used (Kruskal-Wallis, Mann-Whitney, and Spearman correlation tests); Holm-Bonferroni corrections were applied to group comparisons.

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Controlling for inattention, VADQ scores were associated with dispositional hyper-focus in autism+ADHD, p=.03. Controlling for inattention, MISTA loudness/overwhelm scores were associated with dispositional hyper-focus in autism+ADHD and controls, p’s≤.002; controlling for dispositional hyper-focus, loudness/overwhelm was associated with inattention in ADHD-only and controls, p’s≤.04. Controlling for inattention, MISTA anger/misophonia scores were correlated with dispositional hyper-focus in autism+ADHD and controls, p’s≤.02; controlling for hyper-focus, anger/misophonia was associated with inattention in autism-only, ADHD-only, and controls, p’s≤.04.

Conclusions: Hyper-focus and sensory discomfort were common in neurodivergent people. As expected, phenotypes of auditory sensory discomfort were associated with hyper-focus as well as inattention, suggesting these sensory experiences at least partly reflect real-world attention allocation. Unexpectedly, hyper-focus, but not intense interests, seemed elevated in ADHD relative to autism. This could suggest hyper-focus and monotropic attention have multiple dissociable aspects. Thus, further research on characterization and measurement of hyper-focus in neurodivergent and neurotypical populations appears necessary.
Methods: Latent Profile Analysis was conducted on a sample of 1892 autistic youth (M<sub>age</sub> = 10.82, SD<sub>age</sub> = 4.14; 420 females) using items from the RI and UI subdomains of the Dimensional Assessment of Restricted and Repetitive Behaviours. Identified profiles were then compared on key demographic, cognitive, and clinical variables including age, sex, IQ, language level, anxiety, and core autism characteristics.

Results: Three profiles of autistic individuals were identified, characterized as Low CI, Predominantly RI, and Predominantly UI. This model exhibited high entropy (.92) and high latent profile probabilities (.97, .93, 1.00, respectively) indicating good classification accuracy. Profiles differed on several key demographic and clinical variables, such that participants in the predominantly RI profile were significantly older (F = 9.21, p < .001, $\omega^2 = .009$), scored higher on cognitive functioning (F = 10.41, p < .001, $\omega^2 = .019$), and showed higher language levels (F = 27.84, p < .001, $\omega^2 = .028$) than the participants in low CI or predominantly UI profiles. They also presented with more anxiety (F = 5.64, p = .004, $\omega^2 = .007$) and obsessive-compulsive behaviors (F = 4.87, p = .008, $\omega^2 = .004$) than the low CI profile. Meanwhile, participants in the Predominantly UI profile presented with significantly greater social and communication impairments than participants in the other two profiles (F = 4.77, p = .009, $\omega^2 = .004$). Finally, profiles differed on sex composition with males significantly more likely to be in the low CI profile and females significantly more likely to be in the predominantly RI profile ($\chi^2 = 9.09$, p = .011, V = .070).

Conclusions: Although replication across other samples is needed, profiles identified in this study are potentially promising for future research given their distinct profiles of RI and UI endorsements and unique patterns of associations with key cognitive and clinical variables. Indeed, that profiles differed on key clinical variables provides preliminary evidence that distinct profiles may be underpinned by unique cognitive, and possibly neurobiological mechanisms, and may thus show different patterns of support needs.

Background: Circumscribed interests (CI) are a core diagnostic feature of autism spectrum disorder estimated to be present in upwards of 75% of autistic individuals. Interests and related behaviors encompassed within this domain can be characterized by either a high intensity but otherwise usual topic (e.g., an interest in videogames and music), referred to as restricted interests (RI), or by a focus on topics that are not salient outside of autism (e.g., a fascination with traffic lights or categorization), referred to as unusual interests (UI). Importantly, previous research has demonstrated pronounced variability across individuals in terms of the endorsement of specific RI and UI, however, this variability has not yet been quantified and fully characterized in large samples using formal subtyping approaches.

Objectives: The current study aimed to characterize profiles of CI among autistic youth. It further aimed to explore the association between the identified profiles and key clinical and developmental variables.

Methods: Automated Detection of Video Segments Containing Stereotypical Movements of Young Children with ASD

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Background:

Stereotypical movements (e.g., hand flapping) and a common symptom in many children with ASD. Previous studies of stereotypical movements have mostly been limited to using questionnaires and clinical observations that assess the presence or absence of these movements in a subjective manner. However, quantifying stereotypical movements directly and objectively in individual children is important for setting personal intervention goals and assessing treatment efficacy.

Objectives:

We describe a set of deep learning algorithms that can automatically identify and quantify the presence of stereotypical movements in video recordings of children with ASD. We demonstrate the accuracy of this system in quantifying stereotypical movements during ADOS-2 assessments.

Methods:

We manually annotated video segments with stereotypical movements in 316 videotaped ADOS assessments of 265 children with ASD between the ages of 1.4 and 6.7. The start and end times of each movement were noted, yielding a library with >10000 exemplars of stereotypical movements. We utilized the OpenPose algorithm to extract the skeleton of all individuals in each video frame and applied the
YOLOv5 model trained to detect the child in each frame, from the multiple individuals presented (i.e., clinician and parents). The child’s skeleton was used as input to train a deep neural network, PoseC3D, to identify segments where the child performed stereotypical movements.

We used exemplars from 218 children to train the algorithm and tested its accuracy on exemplars belonging to 47 independent children (i.e., different children).

After training the algorithm, we ran a sliding window of fixed size over the videos of the testing set and computed a likelihood score for the presence of a stereotypical movement on each segment/window. The accuracy of the algorithm was then compared to manual annotations by examining the intersection-over-union that gives each pair of segments an overlapping score between 0 to 1.

Results:

The algorithm detected 24.16 stereotypical movements per assessment, on average, in each of the children from the test dataset. These movements had a mean duration of 10 seconds. Overall, we achieve an accuracy score of 94.5%. The detected movements overlapped with 79% of the manually annotated movements demonstrating high accuracy in identifying existing stereotypical movements (i.e., 79% recall). However, the precision of the algorithm was only 55% indicating that the algorithm also classified many segments as containing stereotypical movements that did not contain such movements according to manual annotation (i.e., false positives).

Conclusions:

The results demonstrate promising results regarding the ability to accurately identify and quantify stereotypical movements from video recordings of children with autism. Further refinement of this technique will enable both basic and clinical research to quantify stereotypical movements in a direct and objective manner to understand underlying mechanisms and the clinical efficacy of interventions.

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304.004 (Oral) A Different Spectrum of Power Laws for Autistic Movements

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Background:

Many autistic people move their body in a different way from non-autistic people. Indeed, a number of motion tracking studies have shown that autistic people tend to move with increased jerk (where jerk is defined as a change in acceleration). Mathematical laws of biological motion predict that people should move in a smooth, ‘minimally jerky’ fashion. Thus, the finding that autistic individuals move with increased jerk is striking because it potentially indicates a departure from highly replicable laws of motion. Studies to date have not, however, directly tested this hypothesis. Since deviations from classic laws of motion may indicate differences in motor cortical control policies and/or biomechanical constraints understanding whether autistic movements deviate from these laws can help us progress towards an understanding of the mechanisms underpinning motor control differences in autism.

Objectives:

Here we investigated whether movements executed by autistic adults diverged from the typical power law relationship that links movement speed and curvature.

Methods:

x and y position of the stylus tip was recorded at 133 Hz while 21 autistic (M:F = 19:2; mean age = 36 years, mean IQ = 110) and 19 non-autistic (M:F = 18:1; mean age = 30 years, mean IQ = 108) age-, IQ- and sex-matched adults traced, on a tablet device, a range of shapes that varied in angular frequency (the number of curvature oscillations per cycle) from 2/33 (spiral-like shapes) to 4 (square-like shapes). The gradient of the relationship between speed and curvature for each angular frequency-defined shape is reliably predicted by a set of mathematical equations often referred to as ‘fundamental power laws’, thus to assess deviations from power laws we compared autistic and non-autistic participants in terms of these speed-curvature gradients. To gain insight into potential mechanisms underpinning any differences we also used fast Fourier transform to explore amplitude spectral density across all angular frequencies.

Results:
Compared to non-autistic adults, autistic adults exhibited significantly steeper speed-curvature gradients (main effect of group: \( F(1,1300) = 4.35, p = .037 \)). Fast Fourier transform further revealed differences between the groups (main effect of group: \( F(1,1298) = 4.69, p = .031 \)). Non-autistic participants exhibited highly precise modulation of speed oscillations around the target frequency. For example, when drawing an ellipse their speed profile was dominated by speed changes in a band centred around the angular frequency two with minimal changes in other bands. Autistic adults, in contrast, exhibited less precise modulation of speed oscillations around the target frequency, a result that is reminiscent of a literature reporting broader auditory filters in autistic individuals.

Conclusions:

1. These results evidence, in autistic adults, a deviation from the power laws that typically govern movement and suggest differences in motor cortical control policies and/or biomechanical constraints.

### POSTER SESSION — sensory, motor, and repetitive behaviors and interests

#### 425 - Sensory, Motor, and Repetitive Behaviors and Interests I

**425.289 (Poster) A Longitudinal Comparison of Self-Injurious Behavior Among a Clinical Cohort of Young Children with Autism and Developmental Delay**  
**A. F. Dimian and F. J. Symons, University of Minnesota, Minneapolis, MN**

**Background:** The developmental trends associated with the emergence and persistence of self-injurious behavior (SIB) are not well understood. There is considerable heterogeneity early on and the research to date is not clear on how SIB developmentally changes and further how to identify those with an elevated likelihood of severe or chronic SIB. Early identification is critical to leverage intervention programming to decrease SIB and increase quality of life.

**Objectives:** The purpose of this preliminary study was to assess the longitudinal trends of SIB within a clinical cohort of children with neurodevelopmental disabilities. We compared SIB prevalence and incidence rates over approximately a year at three time points. We also assessed differences in SIB trends, repetitive restrictive behavior, and sensory features among children with autism spectrum disorder (ASD) and children with global developmental delay or other neurodevelopmental disabilities (e.g., ADHD).

**Methods:** We recruited a clinical cohort of children (n=32; 75% male, age 1-10 yrs (M=5.25 yrs)) receiving care at a medical center for developmental delay and related disabilities. Tele-based remote assessments were administered every 4-6 months, on average, at three time points over a 1-year time period. The assessments included parent reported electronic surveys to assess SIB, repetitive behavior, and sensory related behaviors. We evaluated SIB/repetitive behavior using the repetitive behavior scale for early childhood (RBS-EC; Wolff et al., 2016) and the sensory experiences questionnaire (SEQ 2.1; Baranek, 1999) at each time point as well as demographics and service utilization. We evaluated SIB trends using descriptive analyses as well as mean differences between diagnostic groups using Independent samples T-tests.

**Results:** The cohort included 59% with ASD, 34% with Global Developmental Delay and 31% with co-occurring neurodevelopmental disorders or delays (e.g., ADHD). SIB point prevalence was 75%, 66%, and 63%, respectively at timepoint 1, 2, and 3. SIB incidence was 37.5% over 12-months. Persistent SIB estimates (i.e., SIB endorsed at each timepoint) was 56%. Hits self with body part or against surface was the most endorsed topography of SIB across each timepoint (40%-47%). The odds of engaging in persistent SIB was 3.5 times higher among autistic children compared to children with developmental delay within the cohort. At timepoint 3, parents endorsed significantly more severe and interfering SIB (M= 5.21, SD= 5.23) among children with ASD in comparison to those without ASD (M= 1.85, SD= 3.83), \( \tau(29) = -2.09, p = .04 \). There were no other significant effects across the timepoints evaluated or among sensory features.

**Conclusions:** The results of our preliminary study indicated that SIB was highly prevalent, more severe, and persistent among children with ASD in comparison to those with other neurodevelopmental disabilities. These results have implications for clinical care in that SIB should be monitored and assessed early especially for children with ASD. A limitation of this study is the small sample size, which limits the external validity of the results reported. Future research and clinical care should focus on the behavioral mechanisms related to the incidence and persistence of SIB among autistic children to inform more precise care and intervention.

**425.290 (Poster) A Multimodal Approach Can Identify Specific Motor Profiles in Autism and Attention Deficit/Hyperactivity Disorder**  
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**Background:** The developmental trends associated with the emergence and persistence of self-injurious behavior (SIB) are not well understood. There is considerable heterogeneity early on and the research to date is not clear on how SIB developmentally changes and further how to identify those with an elevated likelihood of severe or chronic SIB. Early identification is critical to leverage intervention programming to decrease SIB and increase quality of life.

**Objectives:** The purpose of this preliminary study was to assess the longitudinal trends of SIB within a clinical cohort of children with neurodevelopmental disabilities. We compared SIB prevalence and incidence rates over approximately a year at three time points. We also assessed differences in SIB trends, repetitive restrictive behavior, and sensory features among children with autism spectrum disorder (ASD) and children with global developmental delay or other neurodevelopmental disabilities (e.g., ADHD).

**Methods:** We recruited a clinical cohort of children (n=32; 75% male, age 1-10 yrs (M=5.25 yrs)) receiving care at a medical center for developmental delay and related disabilities. Tele-based remote assessments were administered every 4-6 months, on average, at three time points over a 1-year time period. The assessments included parent reported electronic surveys to assess SIB, repetitive behavior, and sensory related behaviors. We evaluated SIB/repetitive behavior using the repetitive behavior scale for early childhood (RBS-EC; Wolff et al., 2016) and the sensory experiences questionnaire (SEQ 2.1; Baranek, 1999) at each time point as well as demographics and service utilization. We evaluated SIB trends using descriptive analyses as well as mean differences between diagnostic groups using Independent samples T-tests.

**Results:** The cohort included 59% with ASD, 34% with Global Developmental Delay and 31% with co-occurring neurodevelopmental disorders or delays (e.g., ADHD). SIB point prevalence was 75%, 66%, and 63%, respectively at timepoint 1, 2, and 3. SIB incidence was 37.5% over 12-months. Persistent SIB estimates (i.e., SIB endorsed at each timepoint) was 56%. Hits self with body part or against surface was the most endorsed topography of SIB across each timepoint (40%-47%). The odds of engaging in persistent SIB was 3.5 times higher among autistic children compared to children with developmental delay within the cohort. At timepoint 3, parents endorsed significantly more severe and interfering SIB (M= 5.21, SD= 5.23) among children with ASD in comparison to those without ASD (M= 1.85, SD= 3.83), \( \tau(29) = -2.09, p = .04 \). There were no other significant effects across the timepoints evaluated or among sensory features.

**Conclusions:** The results of our preliminary study indicated that SIB was highly prevalent, more severe, and persistent among children with ASD in comparison to those with other neurodevelopmental disabilities. These results have implications for clinical care in that SIB should be monitored and assessed early especially for children with ASD. A limitation of this study is the small sample size, which limits the external validity of the results reported. Future research and clinical care should focus on the behavioral mechanisms related to the incidence and persistence of SIB among autistic children to inform more precise care and intervention.
Background: A rapidly growing literature supports the presence of extensive motor alterations in autism, with effect sizes ranging from 0.87-1.85. This observation has recently prompted a debate about the opportunity of adding motor to the autism definition in future revisions of diagnostic manuals. Whether and to what extent these impairments are specific to autism represents a hot topic within this debate. Previous research suggests that motor difficulties could be common to other neurodevelopmental conditions, but those observed in autism are more severe and persistent. To date, no studies have compared motor skills in autism and attention deficit/hyperactivity disorder (ADHD) through the concurrent use of standardized motor tests, caregiver reports, and kinematic analysis of an upper limb action task. The hypothesis examined in the current study is whether this multimodal approach has the potential to identify more fine-grained motor profiles, specific to each condition.

Objectives: To determine whether a multimodal assessment of motor skills could accurately discriminate autistic children from both ADHD and typically developing (TD) peers.

Methods: 75 children aged 7-13 years and with a full-scale intelligence quotient (IQ) > 80, equally divided into three groups (autism, ADHD, TD), were assessed with the Developmental Coordination Disorder Questionnaire (DCDQ), the Movement Assessment Battery for Children – 2nd edition (MABC-2), the sensorimotor subtests of NEPSY-II, and the kinematic analysis of a reach-to-drop task. Two different principal component analyses (PCA) were applied to MABC-2/NEPSY-II scores and to the 17 kinematic features, respectively, to reduce the quantity of dependent variables while retaining the variation present in the data set. Group differences on DCDQ, PCA1, and PCA2 scores were then analyzed by multivariate analysis of covariance (with age and IQ as covariates). Last, three separate logistic regression models (autism vs TD, ADHD vs TD, and autism vs ADHD) were used to predict group membership based on variables showing between-group differences at analysis of covariance.

Results: Results from PCA on MABC-2/NEPSY-II identified three factors — namely, Object Interception & Balance, Motor Imitation, and Fine-Motor Skills — whereas PCA on kinematic variables identified four factors, as previously done (Crippa et al., 2021). In the model comparing motor functioning of autistic and TD children, DCDQ total score and Motor Imitation factor predicted membership with an accuracy of 87.2%. In the model comparing ADHD and TD group, Fine-Motor Skills predicted membership with an accuracy of 79.6%. In the last model, Object Interception & Balance factor differentiated autistic from ADHD children with an accuracy of 73.5%.

Conclusions: The present study shows that specific motor profiles in autism and ADHD can be isolated with a multimodal investigation of motor skills. On one hand, this study adds to prior studies documenting distinct motor difficulties in autism on standardized measures of motor function. On the other hand, in line with our recent findings (Crippa et al., 2021), kinematics did not differentiate school-aged autistic children from ADH and TD peers, substantiating the evidence that kinematic measures could be more appropriate for identifying autistic toddlers (Crippa et al., 2015).

425.291 (Poster) A Preliminary Investigation of Tactile Reactivity in Autistic Children


Background: The diagnostic criteria for autism spectrum disorder include differences in sensory reactivity (DSM-5; APA, 2013). Sensory reactivity is commonly measured using indirect proxy reports (e.g., Sensory Experiences Questionnaire; (Baranek et al., 2006). Quantitative sensory testing (QST; Walk et al., 2009) is a method that may provide insight into underlying pathophysiological mechanisms in relation to somatosensory function. Although limited, there have been applications of QST to samples of autistic individuals (Fründt et al., 2017; Vaughan et al., 2020). However, QST requires the ability to self-report and relies on reaction times, thus posing issues for individuals with complex communication needs or motor delays. In samples with intellectual disabilities, cerebral palsy, and Rett syndrome, we established initial validity evidence for a modified QST (mQST) approach that is not dependent on language or reaction time (Barney et al., 2020; Merbler et al., 2020; Symons et al., 2010). However, feasibility and validity of the mQST in autistic samples are yet to be established.

Objectives: The objective of the current study was to conduct a preliminary investigation of the feasibility of the mQST in detecting sensory reactivity differences to tactile stimuli among autistic and nonautistic children.

Methods: The mQST protocol was implemented with 10-year-old children (n = 8 autistic; n = 37 nonautistic). The mQST protocol consisted of 6 sensory stimuli (light touch, pinprick, cool, pressure, repeated Von Frey, and heat) and a sham. Behavioral reactivity scores for each participant for each stimulus were quantified using a behavioral coding scheme to capture gross motor, facial, and vocal responses to each stimulus. Descriptive statistics (mean and standard deviation), two-sample t-tests, and effect size (Cohen’s d) were computed.

Results: Two-sample t-tests compared behavioral reactivity to mQST stimuli in autistic and nonautistic children. Autistic children demonstrated significantly increased sensory response, with medium to large effect sizes, compared to nonautistic children, for light touch (t(43) = -2.38, p = .045, d = -1.35), heat (t(43) = -2.80, p = .023, d = -1.29), pinprick (t(43) = -2.56, p = .025, d = -0.91), and the last five
Background: Autism spectrum disorder (ASD) defines a group of heterogeneous neurodevelopmental conditions that are commonly associated with Sensory processing (SP) impairment. Otoacoustic emissions (OAEs) are weak acoustic signals emitted from the outer hair cells in the cochlea, spontaneously or in response to sensory stimulation. In all mammals, OAE production is regulated by the brainstem to facilitate auditory processing. Multiple non-ASD related studies linked aberrant OAE patterns with a decreased speech recognition, impaired brain connectivity and aberrant sensory processing in general (visual, auditory, olfactory, gustatory, and tactile).

Objectives: To assess the feasibility of a novel OAE assessment paradigm, to detect aberrant OAEs in young children with ASD compared with matched typically developing children.

Methods: An OAE measurement device recorded both the ipsilateral and the contralateral auditory efferent pathways. The vowel "Eh" was used as stimuli. This stimulus is longer, more complex and includes vowel formants as compared with standard OAE tests stimuli. Time/frequency/volume distribution patterns relative to the basic stimulus profile were assessed in 12 children with ASD (ages 2-9 years) and 12 age and gender matched typically developing (TD) children.

Results: Sub-sections analysis of the OAE measured response matrix revealed a significant group difference between the ASD and TD groups. Standard OAE response to the first 3 vowel formants was observed in all the TD participants. However, the OAE response to the vowel formants in all the ASD participants was either delayed, blurred or absent completely.

Conclusions: Using a novel OAE assessment paradigm, we were able to demonstrate aberrant OAE response profiles in all of the children with ASD compared with none of the TD children. OAE response profiles are associated with speech processing, connectivity, and SP in general. Hence, these results support the feasibility of OAE measurement as a non-invasive, diagnostic, and possibly stratifying pathophysiologic biomarker for ASD. Further studies are required to assess the sensitivity, specificity, and stratification validity of OAE measurement in young children with ASD.
Background: Children with ASD have a high rate of co-occurring irritability symptoms, which are associated with poor outcomes. Irritability, defined by frequent and impairing anger outbursts, affects approximately fifty percent of children with ASD. Irritability is associated with poor emotion regulation (Stringaris, 2018), communication deficits, and sensory sensitivities (Kanne, 2011). However, as irritability has not been investigated.

Objectives: We aimed to examine the association of sensory processing differences and irritability in children with a diagnosis of ASD.

Methods: We used data from a sample of autistic children (N=55; 11.3±2.45, 18.2% female) with IQ>=85. All children had a diagnosis of ASD, supported by the Autism Diagnostic Interview-Revised (ADI-R) and the Autism Diagnostic Observation Schedule (ADOS). Irritability was quantified using the Aberrant Behavior Checklist (ABC; irritability subscale T-score), and sensory differences were measured using the Short Sensory Profile (SSP). The SSP has seven subscales: tactile sensitivity, taste/smell sensitivity, movement sensitivity, underresponsive/seeks sensation, auditory filtering, low energy/weak, and visual/auditory sensitivity. The sample was further characterized on IQ using the full scale-4 IQ and autism traits using the Social Communication Questionnaire (SCQ). Linear regression analysis was used to examine the association of sensory processing differences and irritability in the sample at a significant level of 0.05, using individual models for each SSP subscale, and correcting for multiple comparisons using the FDR method (7 subscales of the SSP). To control for the effects of symptom intensity and cognitive ability, we first regressed irritability against SCQ and IQ (sequentially) and used the residuals to examine the impact of SSP.

Results: After accounting for the effects of autism traits (Social Communication Score) and full scale IQ, increased sensory differences were found to be significantly associated with increased irritability in the auditory filtering (F(1,118)=7.25, p-corr=0.04) and under responsive/seeks sensation subscales of the SSP. Using age and sex as covariates did not change the conclusions.

Conclusions: From our results, significant and negative correlation was found between the factor of fine motor/perceptual in SP and language conceptual inference ability in children with ASD, but not in the TD children (i.e., more problems in the fine motor/perceptual characteristics are associated with lower language conceptual abilities in children with ASD). In children with ASD, difficulties of integrating sensory information perceived from inside and outside the body and adjusting fine movements are related to deficiencies of language semantic conceptual formulation.

425.294 (Poster) Association between Sensory Processing Differences and Irritability in ASD

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Objectives: The study investigated the association of irritability with the dimensions of RRB measured by the Repetitive Behavior Scale-Revised (RBS-R) (Bodfish, 2000).

Methods: The sample included 82 children with ASD, ages 8-15 years (M = 11.73, SD=1.74); 19 identified as female and 63 as male. Diagnosis was based on the ADI-R conducted by a research-reliable clinician and corroborated with the patient's medical history. Full-scale IQ was evaluated using the Differential Abilities Scales (DAS). Parents completed the Affective Reactivity Index (ARI), the Repetitive Behavior Scale-Revised (RBS-R), and the Social Responsiveness Scale-2 (SRS-2). Pearson correlations with Holm-Bonferroni correction were used to test bivariate associations of irritability with the six subscales of the RBS-R. To examine the contribution of restricted repetitive behavior to irritability in ASD, a hierarchical linear regression predicting ARI irritability was conducted. Age, IQ, and social communication difficulties, as indexed by the Social Communication and Interaction (SCI) subscale of the SRS, were controlled for in the analyses.

Results: The sum score of three of the six subscales in the RBS-R were included in the analyses. Irritability as measured by the Affective Reactivity Index was correlated with (1) Sameness Behavior (r80 =0.46, p<0.001), (2) Ritualistic Behavior (r80 =0.30, p=0.007), and (3) Compulsive Behavior (r80 =0.28, p=0.013). As these RRB subscales were significantly intercorrelated, their sum score was used in the regression analyses to avoid multicollinearity. After accounting for age, IQ and social communication difficulties as covariates in our regression model, there was a significant positive effect of restricted repetitive behavior on irritability (Model \( R^2 =0.516, R^2 \text{ change}=0.071, F_{1,68}\text{change}=6.388, p<0.014 \)).

Conclusions: RRBs are classified into subtypes consisting of stereotyped behavior, self-injurious behavior, compulsive behavior, insistence on sameness, ritualistic behaviors, and restricted interests. Results indicated that only insistence on sameness, ritualistic behaviors, and compulsive behaviors were associated with greater irritability in autistic children. Within the sample, rates of stereotyped behavior and self-injurious behaviors were relatively low in comparison to previous findings. Additionally, the mean IQ of our sample was 99.9 (SD = 19.7). Therefore, these findings may not generalize to severely affected individuals with ASD. However, the study provides evidence for the association between irritability and insistence of sameness, and ritualistic behaviors in ASD populations. These domains of restricted repetitive behavior may provide a target for future psychosocial interventions aimed at improving emotional well-being of children with ASD.

425.296 (Poster) Associations between Brainstem Maturation and Sensory Issues in Autistic Individuals
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Background:
Autistic individuals often suffer from auditory sensory processing disruptions. We have hypothesized that auditory sensory issues may be related to delays in auditory brainstem maturation in autism, which has been structurally observed by neuroimaging and post-mortem analysis. Functionally, this delay is measured through the auditory brainstem responses (ABR), an auditory evoked potential recorded through electrodes on the scalp. Alterations in ABR latencies indicate a reduced sound sensitivity which seems counterintuitive given the increased sensory sensitivities reported by autistic individuals. This discrepancy could be due to the heterogeneity of autism.

Objectives:
To investigate the link between brainstem development indexed via ABR and sensory issues using a parent-reported sensory measure.

Methods:
Autistic (n=12; data collection ongoing) and non-autistic (n=12) children aged 8–13years completed a hearing evaluation and an ABR recording session. The hearing evaluation consisted of a visual inspection using an otoscope, tympanometry (226Hz probe), audiogram (250-8kHz), and distortion product otoacoustic emission evaluation (2kHz–8KHz). The ABR paradigm consisted of a slow click-rate (19.1clicks/second) and a fast click-rate (59.1clicks/second), and acoustic stimuli at 80dBnHL intensity across both ears. Participants listened passively while watching a silent video. Parents completed the Sensory Profile questionnaire.

We conducted three-way, mixed-model, repeated-measure ANOVAs with within-subject factors of ear and stimulus click-rate, and a between-subject factor of diagnostic group. Absolute latencies of peaks I, II, III and V, and the inter-peak latencies (IPL) of peaks I-III and I-V were evaluated. Peak latencies with a significant group difference were correlated with the sensory seeking, sensory avoiding, and sensory sensitivities quadrants of the sensory profile.

Results:
Background: Over 90% of children with ASD have atypical sensory experiences that can exacerbate learning, developmental, and behavioral difficulties (Leekham et al., 2007, Henry et al., 2007). Additionally, early sensory-regulatory and social-communicative deficits contribute to later language outcomes (Baranek et al., 2018). Sensory features in infancy may be a factor that discriminates ASD in early development, yet few studies have investigated sensory profiles in infants younger than 18 months (Garon et al., 2009).

Objectives: 1) Describe sensory profiles in 9-month-old infants with elevated genetic likelihood for ASD, infants born preterm, and with low likelihood for ASD. 2) Investigate associations between sensory profiles and social communication risk.
Methods: Participants include 9-month-old infants (N=68) at elevated genetic likelihood for ASD (EL; n=19), infants born preterm (PT; <37 weeks; n=23), and low likelihood for ASD (LL; n=26). Parents completed the Infant Toddler Sensory Profile-II (ITSP-2, Dunn 2014) to evaluate sensory profiles in 9-month-old-infants and the First Year Inventory (FYI, Baranek et al 2003) to assess behaviors in 12-month-old-infants that suggest risk for ASD. Group differences in sensory profile raw scores (seeking, avoiding, sensitivity, and registration) and sensory processing (general, auditory, visual, touch, movement, body position, and oral sensory) raw scores were investigated using a one-way ANOVA. These raw scores were then dichotomized into “High” and “Low” categories based on the ITSP-2 manual to examine associations between sensory profiles and FYI social communication scores.

Results: A one-way ANOVA showed significant group differences for sensory seeking F(2,65)=12.61, p<0.05, movement processing F(2,65)=5.46, p<0.05, and visual processing F(2,65)=4.25, p<0.05. Post hoc analyses (Tukey’s HSD) indicated: 1) lower seeking in EL infants compared to LL and PT infants 2) lower movement processing in EL infants and PT infants compared to LL infants 3) and lower visual processing in EL infants than LL infants and PT infants (Fig 1). Results revealed non-significant group differences for other sensory processing patterns & subtests (all p’s>0.05). Paired sample t-tests were used to assess associations between sensory profiles with significant group differences (seeking, movement, and visual) and social communication risk. Results revealed that low sensory-seeking infants showed a higher social communication risk score compared to high sensory-seeking infants (t(39.81)=2.36, p<0.05; see Fig 2). Infants with low movement processing scores also showed higher social communication risk compared to infants with high movement processing (t(39.81)=-2.10, p < 0.05). There was no significance between social communication risk and visual processing (p>0.05).

Conclusions: Our findings suggest that EL infants exhibit a sensory profile characterized by reduced sensory seeking, particularly for movement and visual behaviors, compared to LL and PT infants. In movement behaviors, PTs were similar to ELs. Infants with low sensory seeking and low movement processing were associated with higher social communication risk. This suggests that sensory seeking and movement processing may be features associated with atypical social and language development. Further understanding of the use of differential sensory processing patterns in early infancy may provide more salient markers for early-emerging ASD symptomology.

425.299 (Poster) Associations between Specific Motor Skills and Daily Living Skills in Consideration of Age and IQ

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Background: Motor skills and daily living skills (DLS) relate in both autistic and non-autistic individuals (Bremer & Cairney, 2018; Fears et al., 2022; Fisher et al., 2018; Travers et al., 2017, 2022). However, “motor skills” covers a broad spectrum of motor tasks, and more information on how specific motor tasks map onto daily living skills is needed. Two previous studies (Bremer & Cairney, 2018; Fears et al., 2022) found that fine motor skills but not balance related to daily living skills. However, IQ was not considered as a moderator, though previous research found that balance-DLS relations were only observed in those with lower-than-average IQ (Fisher et al., 2018). Research is needed to further examine DLS in relation to fine motor tasks, while also examining potential balance-IQ interactions and other aspects of motor performance, such as bilateral coordination, speed/agility, and strength.

Objectives: We sought to determine how items on the Bruininks-Oseretsky Test of Motor Proficiency, 2+ edition (BOT-2) Short Form related to DLS standard scores on the Vineland Adaptive Behavior Scales-2+ or 3+ edition (VABS-II, Vineland 3). We hypothesized that fine motor precision (drawing a line through a crooked path, folding paper), fine motor integration (copying a square, copying a star), and manual dexterity (transferring pennies) tasks would be related to DLS, but upper limb coordination (dropping and catching a ball, dribbling a ball) would not. Additionally, we hypothesized an interaction of IQ on balance and DLS. Lastly, we explored how bilateral coordination (jumping in place, tapping feet and fingers-same sides), running speed and agility (one-legged stationary hop), and strength (push-ups, sit-ups) individually relate to DLS, novel areas of study.

Methods: Participants were 103 autistic children (between ages 6-17) with an IQ of 60 or higher. Participants completed the BOT-2 Short Form and parents/caregivers completed the VABS-II/Vineland-3 depending on study timing. Most (n= 84) had VABS-II data. We used partial correlations adjusting for age and IQ to analyze which motor skills related to DLS, with false discovery rate corrections. We used multiple linear regression to determine whether IQ interacted with balance in relating to DLS, controlling for age.

Results: Only drawing (r = .32, p = .01) and folding (r = 0.30, p = 0.02) related to DLS, both with small effect sizes. IQ interacted with balance, b = -0.04, SE = 13.84, t(99) = -2.06, p = 0.04.

Conclusions: The results suggest that only fine motor precision tasks were related to DLS, which supports the need for fine motor precision in real-world tasks, such as shoe-tying. This finding also emphasizes the need for fine motor precision skill development in interventions. These results did not find that bilateral coordination, speed/agility, nor strength were related to DLS. Similar to Fisher et al. (2008), balance-DLS relations were only observed in the lower-than-average IQ group. This finding suggests that balance likely interacts with cognitive factors to impact DLS, perhaps suggestive of compensatory strategies implemented to offset balance differences during DLS performance.

425.300 (Poster) Characterizing the Complexity of Insistence on Sameness: From Nosology to Mechanisms
Background: Insistence on Sameness (IS) is a complex and heterogeneous domain that encompasses a range of behavioral patterns, including, but not limited to, inflexible adherence to routines, ritualized patterns of behaviors, and resistance to change. IS has consistently emerged as a single factor across previous factor analytic studies of general autism assessment measures and dedicated RRB instruments. However, the majority of current measures underscore the breadth and diversity of behaviors, which might have precluded identification of more distinct subdomains. Thus, with more comprehensive domain coverage, it is possible that distinct subdomains may emerge. Further, while previous research has identified several potential mechanisms that may underpin IS, including anxiety, sensory atypicalities, and self-regulation difficulties, it is unclear whether these constructs play similar roles in the expression and severity of different facets of the IS domain.

Objectives: The current study aimed to characterize the structure of IS. Further, if different IS subdomains were identified, it aimed to explore potentially distinct patterns of associations between identified IS factors and key demographic, cognitive and clinical correlates, such as age, gender, cognitive functioning, anxiety, social abilities, and different aspects of self-regulation, and sensory atypicalities.

Methods: The parents of 1892 autistic youth (M<sub>age</sub> = 10.82, SD<sub>age</sub> = 4.14; range: 3-18 years; 420 females), collected through SPARK, completed a battery of online surveys including the Dimensional Assessment of Restricted and Repetitive Behaviors, Social Communication Questions, Parent-Rated Anxiety Scale – ASD, and the Sensory Experiences Questionnaires-3. Exploratory graph analysis (EGA) was conducted on the exploratory subsample (n=971) to examine the network structure of the IS subdomain. The confirmatory application of exploratory structural equation modelling (ESEM) was used in the confirmatory subsample (n=921) to confirm the fit of the model. Generalized Additive Models were used on the combined sample to assess non-linear relationships between each of the identified IS subdomains and key variables.

Results: Three IS subdomains were identified, labelled ritualistic behaviors (IS-Ri), routines (IS-Ro), and sameness behaviors involving another individual (IS-I). This model showed strong structural consistency (replicated in 82% of bootstraps), excellent mean item stability across replications (.94), and was a good fit to the data (CFI=.96; TLI=.95; RMSEA=.06; SRMR=.03). Each subdomain showed a unique pattern of association with key variables. More specifically, while hypersensitivity and social interaction were significantly associated with the IS-Ri and IS-Ro subdomains (F=15.39, p < .001; F=17.83, p < .001), they were not associated with IS-I. Further, while emotional dysregulation was a unique predictor of IS-Ri (F=11.76, p < .001, but not IS-Ro or IS-I, behavioral dysregulation was a unique predictor of IS-Ro (F=4.30, p < .010), but IS-Ri or IS-I.

Conclusions: Current findings provide preliminary evidence that the broad domain on IS may consist of distinct subdomains, each possibly underpinned by different cognitive, and potentially neurobiological mechanisms. Further, the study provides important targets for future research including the possibility of different aspects of self-regulation playing different roles in specific IS manifestations. Therefore, the subdomains identified in this study represent and important, albeit preliminary, step towards informing more targeted IS research and interventions.

425.301 (Poster) Characterizing the Experience of Itch in Autistic Adults Using an Online Survey
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Background:

Despite increased recognition of the sensory differences experienced by autistic people (APA, 2013), itch remains understudied. Anecdotal reports of distress and injury caused by itch for autistic people suggest characterization of the experience of itch for autistic people is needed.

Objectives:

To characterize the experience of itch in autistic adults using an online survey.

Methods:
Participants (N = 282; 197 female; mean age 42.6 years (SD= 12.9)) completed an online survey about their itch experience. Participants self-categorized into one of three groups: diagnosed autistic (N = 154), self-identified autistic (N = 37), and non-autistic (N = 85). There were no group differences in age or sex.

Participants reported on the frequency, severity and impact of three categories of itch: spontaneous itch (no identified sensory trigger), provoked itch (sub-categories for clothing/material, human touch, contact with objects, or secondary to painful stimuli), and medically caused itch (multiple sub-categories). Autistic traits (Autism Spectrum Quotient-10, AQ10; Allison et al., 2012) and general sensory experiences (Glasgow Sensory Questionnaire, GSQ; Robertson and Simmons, 2013) were also measured.

Results:

AQ10 scores were significantly different across groups (p<0.01), with higher mean scores for the diagnosed autistic group, followed by the self-identified autistic and non-autistic groups. GSQ scores followed the same pattern (p<0.01).

Across all itch categories, itch was most frequently reported in the diagnosed autistic group compared to the non-autistic group (all p≤0.02). For provoked and medically caused itch, the frequency of itch was higher in the self-identified group compared to the non-autistic group. For spontaneous itch, the pattern was slightly different (self-identified autistic > diagnosed autistic > non-autistic).

Across all itch categories, itch was reported as more severe in the diagnosed autistic than the non-autistic group (p<0.01). The self-identified autistic group also reported greater severity than the non-autistic group (significant for spontaneous itch; p<0.01). The same significant patterns of group differences were found for all subcategories of provoked itch except for itch provoked by warm or cool objects. For medically caused itch, there were significant group differences for dermatological causes, but not for itch caused by systemic problems or infections and infestations.

All three types of itch impacted sleep, work and leisure activities significantly more in the diagnosed autistic group compared to the other groups (spontaneous itch: p <0.01; others: all p<0.05).

Higher AQ10 and GSQ scores were associated with significantly higher spontaneous and provoked itch severity (r = 0.42-0.52; all p <0.01), with weaker correlations for medical itch (r = 0.16-0.19; all p <0.01).

Conclusions:

Diagnosed autistic adults reported a greater frequency and severity of itch compared to non-autistic adults. This was true for all itch types but most prominently for spontaneous and provoked itch. Itch was also reported as having a more significant impact on sleep, work, and leisure activities for autistic adults compared to non-autistic adults. The experiences of self-identified autistic people tended to fall between diagnosed autistic adults and non-autistic adults. The findings highlight the importance of considering the experience of itch for autistic people.

425.302  (Poster) Clinically-Significant Falls and Fall-Related Injuries Occur at a Much Higher Rate in Autistic Compared to Non-Autistic Young Adults Aged 18-35 Years

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Background: Falls and fall-related injuries are a common cause of injury, mobility limitation, morbidity, and death. Studies have shown that autistic individuals experience motor difficulties and have trouble with balance and coordination, perhaps placing them at higher risk of falls than their non-autistic peers. The autistic community has expressed anecdotally that these motor problems lead to fear of falling, reduced participation, and injury. However, little is known about the specific prevalence and nature of falls and fall-related injuries in autism, and their clinical significance.

Objectives: To determine the incidence of falls experienced by autistic young adults (18-35 years) compared to non-autistic young adults in the University of Michigan healthcare system during a 5-year period from 2017-2022.

Methods: We accessed retrospective data from the electronic medical records of autistic young adults who were seen by Michigan Medicine providers (University of Michigan healthcare system) between October 2017 and October 2022. Data were obtained using the university’s data warehousing service, DataDirect. To separate the autistic and non-autistic cohorts, we filtered patients by problem list and list of diagnoses using a total of 81 codes related to autism. These included ICD-9 and ICD-10 codes, DSM-5 codes, and internal Michigan Medicine billing and diagnostic codes.
Results: 361,982 young adult patients (18-35 years) in the U-M health record were seen clinically in the 5-year period from October 1, 2017 to September 30, 2022. Of these, 24,988 were diagnosed with autism, and 336,994 were not. 5.91% (n=1,478) of autistic young adults were seen clinically for falls or fall-related injuries compared to 0.96% (n=3,225) of non-autistic young adults. In other words, clinically-significant falls or fall-related injuries were more than six times more common among autistic young adults than non-autistic young adults over this 5-year period (Fig.1). We then examined annual data from October 1 to September 30 of each year (2017-2022). While the group difference in incidence of clinically-significant falls or fall-related injuries was slightly smaller in the annual data than in the 5-year aggregate data, autistic young adults were still consistently seen for falls at much higher rates (Fig.2).

Conclusions: The results of this study highlight the disparity in falls and fall-related injuries experienced by autistic young adults. It is concerning that autistic young adults are seen clinically for these issues at more than six times the rate of their non-autistic peers over a 5-year period, at a time in the lifespan where frequent falls do not serve a developmental purpose. The difference between the 5-year and annual incidence rates observed in this dataset is likely a reflection of the number of patients who are seen chronically for falls over multiple years. Future studies should carefully investigate the reasons for falls and fall-related injuries, the incidence of repeated falls, and the incidence of benign falls for which young adults may not seek clinical care. This knowledge can inform efforts to reduce fall risk and increase access to fall-prevention strategies and motor interventions in autism, for example, those that focus on improving dynamic postural control and mobility.

425.303 (Poster) Decreased Sensory Threshold in 22q11.2 Deletion Carriers Is Associated with Thalamocortical Hyperconnectivity, but Not Sleep Disturbance
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Background: Study of highly penetrant genetic mutations that confer increased likelihood of being autistic can reveal novel genetic and neurobiological mechanisms associated with common challenges of autistic individuals. One such mutation is a deletion in the 22q11.2 locus (22qDel), which confers an approximately 8-fold increase in likelihood of autism. Studies of both 22qDel carriers and individuals with idiopathic autism report hyperconnectivity between the thalamus and cortical sensory regions during resting-state functional magnetic resonance imaging (rs-fMRI). In idiopathic autism, this thalamocortical hyperconnectivity is associated with sensory sensitivity and sleep problems, suggesting thalamic over-relay of sensory information could underlie both of these distressing challenges. Our previous work in 22qDel carriers found thalamocortical hyperconnectivity was associated with more severe sleep disturbance, but the role of sensory sensitivity in this relationship is unclear.

Objectives: To characterize sensory profiles of 22qDel carriers and test the hypothesis that a lower sensory threshold (sensory sensitivity) is associated with increased thalamocortical connectivity and worse sleep in 22qDel carriers.

Methods: As part of an ongoing longitudinal study, 22qDel carriers (n=50; M_age=230.0 months, 46% male) and typically developing (TD) controls (n=44; M_age=204.2 months; 45.5% male) completed rs-fMRI scans and assessments of sleep and sensory profiles. We used the Adolescent/Adult Sensory Profile to measure four dimensions of sensory processing. Higher scores on the Low Registration and Sensation Seeking domains indicate increased sensory thresholds, while higher scores on Sensory Sensitivity and Sensation Avoiding domains indicate decreased sensory thresholds. General sleep disturbance was measured by a clinician-rated scale on the Structured Interview of Psychosis-risk Syndromes (SIPS). First, we tested group differences in sensory domains between 22qDel carriers and TD subjects. Second, we examined the relationship between resting-state thalamocortical coupling with the Somatomotor network (thal-SOM), and sensory profiles in 22qDel carriers. Lastly, we assessed the relationship between sleep disturbance and sensory profiles. For each analysis, we used linear mixed-effects models including Subject ID as the random effects term as well as age and sex covariates. To account for multiple comparisons, a False Discover Rate correction was applied.

Results: Compared to controls, 22qDel carriers scored higher on all sensory domains (q<0.006), except Sensation Seeking, which showed lower scores in 22qDel carriers (q=0.001). Within 22qDel carriers, thal-SOM hyperconnectivity was associated with increased Sensory Sensitivity (b=0.23, q=0.046) and Sensory Avoiding (b=0.250, q=0.039) domain scores. In contrast, worse sleep in 22qDel carriers was associated with higher scores on Low Registration (b=0.31, q=0.032). There were no other significant relationships between sleep disturbance and sensory domains.

Conclusions: As in studies of idiopathic autism, we found 22qDel carriers exhibit increased levels of sensory difficulties. Our results support the hypothesis that thalamocortical hyperconnectivity is associated with a lower sensory threshold in 22qDel carriers. However, contrary to our hypothesis, sleep disturbance was not associated with a lower sensory threshold. These results, along with our previous findings, suggest that thalamocortical hyperconnectivity is related to both sensory sensitivity and sleep disturbances in 22qDel carriers. However, more research is needed to determine if sleep disturbances associated with autism are attributable to sensory sensitivity.

425.304 (Poster) Development and Validation of the Glasgow Sensory Questionnaire Short (GSQ-14)

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Background:

Many autistic people find that differences in their sensory processing present challenges when interacting with the world, especially when not supported. Repeated negative sensory experiences limit the number of environments accessible to the autistic person, reducing both mental health and quality of life. Equally, some sensory experiences can be extremely positive and have the opposite effects.

Objectives:

The Glasgow Sensory Questionnaire (GSQ) is a questionnaire which asks questions about the hyper- and hypo-reactivity of the five main senses, as well as proprioception and the vestibular sense. The standard questionnaire contains 42 questions, which can be burdensome on those completing it. As such, this study aimed to construct and then validate a shortened version of the Glasgow Sensory Questionnaire which can be more easily deployed.

Methods:

The Glasgow Sensory Questionnaire Short (GSQ-14) was constructed using secondary data initially collected by Horder et al. (2014), Ward & Filiz (2020), and unpublished data from our lab. In total, the sample consisted of 787 participants, all of whom completed both the GSQ and Autism Spectrum Quotient (AQ). Several Confirmatory Factor Analysis (CFA) models were compared for best fit. The item with the highest loading for each subscale from the best fitting model were selected for inclusion in the GSQ-14.

The validation data were separately and specially collected using an online sample recruited through Proﬁlic. Our pre-registered power analysis indicated that 75 participants would be sufficient. Exactly 75 participants completed both the AQ-10 and GSQ-14.

Results:

The best fitting CFA model was found to be where the 14 subscales were defined as latent variables and allowed to correlate with each other. Continuing to use the initial construction data, the internal reliability of the new GSQ-14 was found to be good with a Cronbach’s alpha of .84. The GSQ-14 and AQ were found to have a significant correlation ($\rho (785) = 0.49, p < .001$).

These results were then replicated in the validation sample, with the GSQ-14 again being found to have good internal reliability with a Cronbach’s alpha of .83, and having a significant correlation with the AQ-10 ($\rho (73) = 0.59, p < .001$).

Conclusions:

This study has successfully constructed and validated a short version of the GSQ, demonstrating that it is appropriate for wider use. The factor analyses used during the construction also point towards the importance of considering both the hyper- and hypo-reactivity of each sense when researching the sensory processing of autistic people.

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**425.305 (Poster)** Development of the Consortium for Motor Behavior in Neurodivergence (COMBINE)

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Background: There is increased awareness of co-occurrence among neurodevelopmental conditions. Many neurodivergent self-advocates have posed questions about overlapping characteristics among conditions, which have important implications for assessment and intervention/accommodation. However, much research is conducted in silos with tightly-controlled groups, limiting the ability to detect transdiagnostic patterns. Specifically regarding motor behavior, a transdiagnostic approach is needed to determine whether features cluster by diagnosis, or in another manner. Data sharing can help to answer these questions by maximizing sample size and diversity. Models for data sharing exist for other domains including neuroimaging (ABIDE) and general child development (Databrary), specific populations like autism (NDAR, SPARK), or general health outcomes in a specific region (CAPriCORN). Yet, none specifically aggregates data describing motor behavior in neurodivergence across multiple diagnostic groups, ages, and countries. Without such a resource, it is difficult to identify meaningful phenotypic patterns that transcend diagnostic labels.

Objectives: To understand neurodivergent motor behavior across the lifespan by building an international data-sharing consortium.
Methods: We contacted stakeholders in the self-advocate, research, and clinical communities to determine whether COMBINE would be appropriate and useful. We then conducted a literature search to identify researchers using standardized motor assessments in neurodivergent populations, and to create a list of variables. We developed a workflow (Fig.1) by which researchers could join the consortium, initiate regulatory agreements, and deposit/access data. COMBINE was launched at the 15th Developmental Coordination Disorder meeting (July 2022). We disseminated information through communication channels of societies, professional meetings, and targeted emails to specific researchers.

Results: Key infrastructure resulting from the development process included a website (combinedata.org), REDCap forms and R/Excel templates for joining and depositing data, data use agreement and IRB templates, and templates for data access proposals and reporting of results. Required variables include: Movement Assessment Battery for Children (MABC) or Bruininks-Oseretsky Test of Motor Proficiency or Peabody Developmental Motor Scales, age at date of testing, diagnosis, sex assigned at birth or gender, country, site/institution. Recommended variables include additional demographic features and motor and cognitive assessment scores. We identified >50 investigators from 15 countries who have eligible data. The COMBINE database currently includes >500 participants from studies conducted in Texas, Louisiana, and Michigan, with data deposits pending from new members in Australia, Belgium, the United Kingdom, Canada, and other sites in the United States. The dataset includes participants aged 3-52 years diagnosed with one or more conditions including autism, attention deficit hyperactivity disorder, developmental coordination disorder/dyspraxia, dyslexia, dysgraphia, dyscalculia, anxiety, depression, intellectual disability, Down syndrome, sensory processing disorder, speech-language disorders, and mood disorders.

Conclusions: There is a critical need to share data in order to improve the replicability and impact of clinical research. COMBINE has several key advantages over single-site datasets: it is lifespan, transdiagnostic, interdisciplinary, multidimensional, and geographically- and culturally-diverse. This enables data-driven approaches to identifying new patterns of association between and within neurodevelopmental conditions, in order to determine where they converge or diverge in their motor and behavioral characteristics. Ultimately, this knowledge will benefit both clinical practice and our societal understanding of neurodiversity.

425.306 (Poster) Developmental, Motor, and Gender Correlates of Gait Abnormalities in Autism

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Background:

Autism, a neuro-developmental disorder, is characterized by impairments in social interactions, alongside repetitive and stereotyped patterns of behavior (APA, 2013). Persons with autism also demonstrate a variety of motor symptoms which include alterations in motor milestone development (Provost et al., 2007), hypotonia (Calhoun et al., 2011), and postural control impairments (Esposito, 2011; Pradhan et al., 2022). These motor symptoms can compromise the ability to walk, which in turn may affect the individual’s functionality, independence and quality of life. Although it has been shown that autism is associated with abnormal gait patterns (for a review see Lum et al., 2022), few studies have examined gait patterns and their correlates. Furthermore, inconsistencies in the findings from existing research make the examination of the correlates of gait abnormalities an important contribution to understanding the heterogeneity in autism.

Objectives:

The main objective of this study is to identify developmental, motor and gender correlates to the presence of gait abnormalities as reported by parents of children with autism. The developmental correlates examined included the ages when the child began to speak and to walk as well as the developmental trajectory of gait abnormalities; the motor correlates examined were mannerisms and motor stereotypes. These correlates were also analyzed separately for boys and girls. The aims of this research are to identify which developmental and motor correlates are similar and which are different in female and male autism symptomatology.

Methods:

The parents of 112 children were interviewed using the Autism Diagnostic Interview-Revised (ADI-R). Fifty-three girls and 59 boys were matched on cognitive functioning and chronological age. The ADI-R items of interest included the age when the child began to walk unaided, age of first words, age of first phrases, hand and finger mannerisms, as well as complex mannerisms.

Results:

Significant developmental and motor correlates of gait abnormalities emerged for specific ADI-R items, revealing different developmental and motor relations in boys and girls at different ages. Gait abnormalities in preschool-aged girls were correlated with age of walking, age of first phrases, and complex mannerisms, whereas gait abnormalities in preschool boys were correlated with complex mannerisms only. A significant correlation between gait abnormalities and age of first words emerged among school-aged girls, whereas a significant correlation between gait abnormalities and age of first phrases emerged for school-age boys. A significant correlation between age and gait
abnormalities emerged for girls and not for boys. In addition, a significant negative correlation emerged between age and gait abnormalities for the girls but not the boys.

Conclusions:

The results of this study suggest that age and sex have a differential impact on gait abnormalities in autism. As the girls got older fewer gait abnormalities were reported, which did not occur for the boys. Since gait abnormalities can affect independent functioning and quality of life, it is important to understand their developmental trajectory and expression at different ages among boys and girls with autism.

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Background: An extensive body of research exists in visual perceptual processing in verbal individuals with autism. Among others, findings support a local over global visual processing style or bias. In contrast, the minimally verbal (< 30 spoken words, mvASD), comprise almost a third of individuals with autism, yet little is known about their visual perceptual processing. This subgroup is underrepresented in the research literature. Likely due to difficulty conforming to behavioral requirements in existing testing methods

Objectives: To overcome experimental challenges and investigate basic visual processing among children with mvASD.

Methods: Fifteen children with mvASD, ages 6-12 were tested in three separate visual processing tasks on a touch screen. (1) In the oddball paradigm they had to point to an odd target among an array of distractor elements. The low-level stimuli comprised odd colour, size, and shape. Whereas the mid-level stimuli consisted of 3D shapes from shading and perspective. We further examined the impact of distractor saliency and 1st and 2nd order orientation gratings. (2) in the contour detection task by pointing, a circular contour was embedded among increasing number of Gabor elements at 3 levels of difficulty. (3) in the final task a single Kanizsa triangle, was presented as well as 3 modulated versions accentuating (illusory) triangle. Spontaneous pointing and eye gaze were recorded as distance (pix) from centre of the Kanizsa. Verbal instructions and prompted practice trials were provided prior to testing. General cooperation and successful responding was rewarded with praise and access to preferred items.

Results: Already at the low-level vision tests two groups emerged. Ten participants detected the oddball at or near ceiling, whereas the other 5 performed at or slightly above chance. Successful responding among lowest performers increased with reduced distractor saliency. With increasing complexity from 1st to 2nd order gratings and at midlevel vision tests, performance deteriorated among some previously 'high' performers. For the single Kanizsa, pointing and eye gaze were at the local elements, unlike controls, but shifted towards the centre of the Kanizsa with modulations that emphasized the triangle.

Conclusions: All children could do the tasks, with performance sensitive to the distractor saliency and stimulus complexity, but the group was not homogenous and could be divided into low and high performers. The results could not be explained by limited task comprehension or lack of cooperation. They therefore suggest differences in early visual processing among children with mvASD, some presenting diminished performance of the lowest levels of visual processing. Furthermore, for the single Kanizsa, pointing and gaze responses were locally oriented (to the Pac-Men), as though the illusory surface was not perceptually inferred, but shifted to the centre with minor modulation, indicating that perceptual representation of the global does exist. Overall, visual complexity appears to jeopardize performance, suggesting that in mvASD visual perception is based on low-level representations with attenuated inference-based processing. It appears that when incompatible perceptual representations compete for selection, the stronger representation (here local) may guide behavior among minimally verbal children with autism.

425.308 (Poster) Does Disgust Contribute to Picky Eating in Autistic Adults?

Background: Autistic adults self-report symptoms related to picky eating more frequently than non-autistic adults4. Additionally, autistic individuals are five times more likely to develop eating problems including food selectivity, food refusal, and poor oral intake4. Studies have shown that individuals with food-selectivity issues replace fruits and vegetables with unhealthy processed foods, contributing to obesity4. Although higher food disgust has been associated with picky eating in non-autistic adults, most research has focused on and implicated sensory sensitivities as a driving force for picky eating among autistic individuals4,5.

Objectives: Examine the relationship between disgust and picky eating in autistic adults and whether this relationship is mediated by sensory (i.e., oral texture and/or olfactory) processing.
Background: Autistic individuals often report negative experiences with particular sensory stimuli, commonly described as atypical sensory processing. There is a high level of heterogeneity in responses to sensory stimuli, both between individuals, but also within individuals across different contexts. While some previous research has sought to determine the contextual factors that influence sensory processing in autistic individuals, a number of methodological issues have led to inconsistent results, specifically the lack of ecological validity in many lab-based studies and recall bias in qualitative and questionnaire studies.

Objectives: The purpose of this study was to determine the contextual factors that impact sensory processing in autistic individuals using ecological momentary assessment (EMA), an in-the-moment measure of participants’ experiences, and to collect both quantitative and qualitative data on autistic individuals’ sensory experiences.

Methods: We prompted participants to complete a survey of their current sensory environment and experiences on their cellphones three times per day over the course of two weeks. The survey focused on participants’ current activities, surroundings, mood, and sensory experiences. We predicted that contextual factors such as the participants’ level of control over their environment, mood, and the sensory stimuli involved would affect their sensory processing. Additionally, participants completed a battery of standardized measures, including the Sensory Profile (SP) and the Social Responsiveness Scale (SRS).

Results: The sample (n=15) included seven adults and eight children. Participants reported more negative experiences than either positive or neutral experiences. In both children and adults, unpleasant sounds were the most reported negative stimuli and pleasant sounds were the most reported positive stimuli (Figure 1a). Participants reported more positive experiences when they felt they had a high level of control over their environment, while the reported more negative experiences when they were feeling tired or anxious and overwhelmed (Figure 1d). Interestingly, the proportion of sensory events reported as negative did not correlate with scores on the SRS (Figure 2a, p=.745), or the SP (Figure 2b, p=.436).

Conclusions: In conclusion, factors such as mood, surroundings, and the modality of the sensory stimuli all contributed to differences in autistic individuals’ sensory experiences. Differences were found both between and within individual reports of sensory experiences, which is consistent with previous findings. The lack of correlations between the standardized questionnaires and the proportion of sensory experiences reported as negative was unexpected and suggests that the questionnaires may not be a good measure of the heterogeneous sensory experiences that occur across autistic individuals’ daily activities. This could explain the inconsistent results that have been found between lab-based, qualitative, and questionnaire studies in the past. These findings help acknowledge the role that context plays in autistic individuals’ sensory experiences and can have implications for creating supportive environments by controlling for different contextual factors. These findings also have implications for helping autistic individuals develop coping strategies for dealing with these experiences, such as deep breathing or wearing headphones to help reduce feelings of anxiety in situations where they have little control over their environment.
425.310 (Poster) Effect of Restricted and Repetitive Behaviors on Imitation Skills and Parental Stress in Young Children on the Autism Spectrum
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Background: Restricted and repetitive behaviors (RRBs) are core characteristics of autism spectrum disorder and can interfere with the individual’s and their family’s functioning (Harrop et al., 2016; Ulijarević et al., 2022). Research within the past few decades has demonstrated the association between overall social communication deficits and RRBs (Chaxiong et al., 2022; Jones et al., 2018; Lampi et al., 2020; Martínez-González et al., 2022), however little is known about the influence of RRBs on different aspects of early social communication such as imitation (Bruckner & Yoder, 2007). Additionally, a few studies have shown that clinician-observed RRBs measured by the Autism Diagnostic Observation Schedule-Second Edition (ADOS-2; Lord et al., 2012) relate to maternal stress (Schutte et al., 2018), but more information is still needed to understand this relationship. Examining the distinctive contribution of RRBs can help us discern the underlying mechanisms of these behaviors.

Objectives: The present study aimed to examine the relationship between RRBs and spontaneous imitation skills during play among 17 autistic children aged 28 to 57 months old ($M = 40.41$, $SD = 8.65$; 76% males). The secondary aim of the study was to evaluate relationship of RRBs on parental stress.

Methods: Data was drawn from baseline assessment of an on-going RCT of parent-mediated vs. therapist-mediated Reciprocal Imitation Training (RIT). The measures used in this analysis include developmental level (Mullen Scales of Early Learning; Mullen, 1995), autistic symptomatology (ADOS-2; Lord et al., 2012), parent stress (PSI-4; Abidin, 1995), and object and gesture imitation abilities on a play-based assessment (UIA-O & UIA-G; Ingersoll & Meyer, 2011). Hierarchical multiple regression analyses were used to investigate the relationship between total RRBs score on the ADOS-2 and object and gesture imitation skills on the UIA, and parent stress on the PSI. Age equivalents on the visual reception and expressive language domains of the Mullen were entered simultaneously in the first step as covariates, followed by total RRBs in Step 2.

Results: Higher RRBs significantly predicted lower object imitation skills after controlling for nonverbal cognitive skills and expressive language ($β = −1.19$, $t(13) = −2.25$, $p = .042$). RRBs uniquely accounted for 20% of the variance in object imitation abilities, $F(3, 13) = 4.13$, $p = .030$, $ΔR^2 = .20$. RRBs were not associated with gesture imitation skills or total parent stress.

Conclusions: The results of this study demonstrate the relationships between RRBs and object imitation skills in young children with autism. This knowledge is important for understanding how RRBs may relate to other key behaviors in early play and social development. These findings suggest that children with more repetitive behaviors may also struggle to expand their play through imitation, further impeding learning during natural play interactions. Future research should investigate how different subtypes of RRBs (stereotypic movement, insistence on sameness, restricted interests and preoccupations, and sensory difficulties) may impact foundational social communication skills, such as imitation, joint attention, and play.

425.311 (Poster) Effects of Intrapersonal Synchrony on Responses, Gaze Behavior and Judgements of Autistic and Non-Autistic Observers
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Background: Temporal structures of movements that occur between (INTERpersonal) and within (INTRApersonal) individuals shape social encounters. Intrapersonal synchronization (IaPS) of multimodal signals determines the perception of meaningful signal-units from the stream of movements by observers and thus affects reciprocal response behavior (Bloch et al., 2019; Cañigueral & Hamilton, 2019). Studies showed that autistic individuals elicited larger and more variable temporal delays between communicative signals (de Marchena & Eigsti, 2010; Bloch et al., under review). It can be assumed that differences in IaPS systematically influence observers’ perception of a course of motions, which may additionally be influenced by the observer’s diagnostic status. In this study, these assumptions were investigated experimentally.

Objectives: Virtual characters were animated in a way, that they exhibited controlled temporal coupling of deictic gaze and gesture signals. Based on a recent empirical study, the behavior resembled measurements in autistic adults (IaPSASC) and in typically-developed (TD) adults (IaPSTD). This allowed for a controlled experimental manipulation and investigation of the effects of group-specific IaPS on response behavior and post-hoc judgments of autistic and non-autistic observers.

Methods: 68 adults ($n = 34$ with F84.5 diagnosis) were tested. Groups were matched on gender identity (female $n = 12$; male $n = 22$); age ($M_{ASD} = 39.52$ ($SD = 12.80$); $M_{TD} = 37.77$ ($SD = 12.73$)), and IQ ($M_{ASD} = 109.88$ ($SD = 11.39$); $M_{TD} = 107.03$ ($SD = 8.88$)). In a crossed design, autistic and non-autistic participants interacted with the two virtual characters, resembling the IaPS behavior of autistic or TD persons, in 3 blocks of 18 trials per character. In the IaPSASC condition, gaze-gesture delays were enlarged ($M = 450$ ms) and more variable.
(SD = 128 ms) compared to the IaPS\textsubscript{STD} condition (M = 200 ms; SD = 68 ms). The task per trial was to select an object by keypress that indicated by the virtual partner (Figure 1). Gaze was recorded (Eyelink 1000 Plus). After the initial interaction phase, participants rated both interaction partners on items that referred to communication quality and person likeability.

Results: Likelihood ratio tests of linear mixed effects models predicting response times showed significant main effects for group (p = .005), IaPS (p < .001), and a significant interaction of group * IaPS (p = .047), see Figure 2. Exploratory gaze analysis (gaze type classification by dwelltimes on predefined gaze regions & fixations during responses) indicated different strategies in groups: While TD adults showed a primary focus on the partner's gaze region, autistic adults showed a diversified gaze behavior. There were no effects of IaPS on post-hoc judgements beyond chance-level.

Conclusions: The results are consistent with an automatic gaze focus during the perception of gaze and pointing signals in TD observers (Caruana et al., 2021), whereas response strategies in autistic adults were characterized by an increased prioritization of gesture signals. Intrapersonal synchronization of signals affected observers' responses differently depending on the strategy used. The study supports the assumption that social interaction in autism can be characterized by timing features in production and perception.

425.312 (Poster) Efficacy of the First Years Inventory (FYIv3.1) Infant Screener in Predicting Autism Risk Status at 3 Years of Age

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Background: The First Year(s) Inventory, version 2.0 (Turner-Brown et al., 2013) has demonstrated utility as a screening tool in a community sample of 12-month-olds, at least in part because of the inclusion of items designed to tap both prodromal sensory-regulatory (SR) and traditional social-communication (SC) features. The newest version, FYIv3.1 (2013) was expanded to screen a broader age range (6-16 months) and to provide a more comprehensive assessment of SR and SC features. Research on this version confirmed seven risk dimensions: two SC (Communication, Imitation & Play [CIP]; Social Attention & Affective Engagement [SAE]), four SR [Sensory Hyperresponsiveness [HYPER]; Sensory Hyporesponsiveness [HYPO]; Self-regulation in Daily Routines [SREG]; Sensory Interests, Repetitions, Seeking Behaviors [SIRS]), and one in motor development (Motor Coordination and Milestones [MCM]) (Baranek et al., 2022).

Objectives: We aimed to test the efficacy of the FYIv3.1 dimensions in predicting later outcomes groups: No Diagnosis/Concerns (ND), Autism Diagnosis/Concerns (AUT), or Other Diagnosis/Concerns (OD). We estimated sensitivity (true positive rate), specificity (true negative), positive predictive value (true positives/all positive) and negative predictive value (true negatives/all negative).

Methods: Parents of infants ages 6-16 months were recruited through state birth records and asked to complete the FYIv3.1. Scoring of the FYIv3.1 based on frequency probabilities across respondents in this large sample (N=6427). At age 3, a subset (N=2211) completed the Developmental Concerns Questionnaire (DCQ), reporting medical/developmental history/diagnoses, and the Social Responsiveness Scale (SRS-2) to quantify autistic traits. Based on these measures, children were coded into outcome groups, ND, AUT, and OD. We applied machine learning random forest (RF) models using the seven FYIv3.1 risk dimensions, gender and age to develop a decision tree to optimally sort children into ND and AUT groups. We used a 70%-to-30% training to validation ratio. Next, we tested models with progressively greater sensitivity targets. Finally, we applied the initial decision tree to all respondents with 3-year-old outcomes (AUT, OD, ND) to determine the proportion classified correctly into each group.

Results: Results for the training model indicated that 8 variables (6/7 risk dimensions, plus age and sex) were useful in building the decision tree in the training sample; only five of variables (HYPER, SIRS CIP, sex, and age) were needed in the validation sample. Model results can be used to select cut-points over ranges of sensitivity and specificity. We evaluated the model requiring specificity to be at least 95%, yielding a sensitivity of 38% (Table 1). Requiring greater specificity results in loss of sensitivity, but improved PPV. Between 3% and 11% of the OD sample were classified as AUT depending on the specificity of the model.

Conclusions: Results indicate that the FYIv3.1 can be effectively used to accurately classify 38% of children during infancy that later have AUT outcomes with very high specificity (>95%). Sensitivity may be optimized to a much higher level, but with costs to specificity and PPV. These tradeoffs require consideration for different contexts and purposes of screening (e.g., level 1 population screening versus high-risk clinic versus research).

425.313 (Poster) Emotional Regulation Challenges in Children in a Broad Neurodevelopmental Concern Cohort

Background: Children with neurodevelopmental concerns (NDC) commonly present to community practices with prominent emotional dysregulation. To the best of our knowledge, there has not been an assessment or characterization of emotional regulation in this setting. Furthermore, emotional regulation may overlap with sensory processing disorders, specifically tactile sensitivity. This study aims to determine the rate of emotional dysregulation in all comers to a community neurodevelopment practice, determine if this prevalence differs between children with and without autism, and whether there is a correlation with tactile processing differences.

Objectives: N/A

Methods: Participants in this study are children seen at Cortica between 8 and 12 years of age. They are sequentially offered participation in a broader neuroimaging study of which emotional regulation and sensory processing assessment are constituent parts. For this study, parents completed the Short Sensory Profile (SSP; Dunn 1999) and the Behavioral Assessment System for Children, Third Edition (BASC-3; Pearson 2015) parent questionnaires. Additionally, children who scored above 15 on the Social Communication Questionnaire (SCQ; Rutter 2003), were subsequently evaluated with the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; Lord 2012). Those exceeding ASD threshold on both SCQ and ADOS-2 were assigned to the ASD cohort. Three subscales of the BASC-3 were relevant to this analysis of emotional dysregulation: “Anger”: irritated quickly, coupled with an inability to regulate affect and self-control; “Emotional Self-Control”: ability to regulate one’s affect and emotions; and “Negative Emotionality”: tendency to react in an overly negative way to changes in activities/routines. The Tactile Sensitivity (TS) cohort scored 1 standard deviation or greater above the mean for tactile sensitivity section, based on 7 questions.

Results: Of the total NDC population (n=111; 70% male), approximately 60% were found to be either at-risk or showing clinically significant concern for emotional dysregulation across all three relevant subscales of the BASC-3. Although the ASD group (n=17; 82% male) trended towards higher rates of emotional dysregulation, no statistical significance was observed (anger p=0.06, emotional self-control p=0.11, negative emotionality p=0.24). Of the total population, 74 children (66%) were found to be Tactile Sensitive (TS) and in this cohort 75% scored 1 SD or above on all three relevant subscales anger p=3.9 x 10^-7, emotional self-control p=5.4x10^-9, and negative emotionality p=9.0x10^-8; Figure 1). Thus, the TS endophenotype is strongly associated with emotional dysregulation.

Conclusions: Emotional dysregulation occurs in roughly two-thirds of all children presenting for evaluation and support for neurodevelopment. Children with tactile sensitivity are far more likely to struggle with emotional regulation than their peers with NDC who do not experience tactile sensitivity. Conversely, in this initial investigation, autism does not appear to differentiate those with and without emotional dysregulation. The rate of emotional dysregulation suggests a need for a more robust delineation of the neural mechanisms of both tactile information processing and emotional regulation for better clinical understanding and support for these processes.

425.314 (Poster) Examination of the Prevalence and Severity of Self-Injurious Behavior in a Large Sample of Children with ASD from the SPARK Cohort.

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Background:

Self-Injurious behavior (SIB) are commonly reported in individuals with developmental disabilities and Autism Spectrum Disorder (ASD). Estimates of the prevalence and severity of various topographies of SIB vary substantially across studies. Further research is needed to gain clarity about the occurrences of variables associated with the occurrences of SIB in children with ASD.

Objectives:

The purpose of this study is to examine patterns of caregiver-reports of SIB and among a large sample of children with ASD.

Methods:

Data from 3,9685 children (mean age= 8.99 years) registered in the Simons Foundation Powering Autism Research for Knowledge (SPARK) was analyzed. All children had a parent-reported diagnosis of ASD. Data on self-injurious behavior was obtained from caregiver responses on the Repetitive Behavior Scale–Revised questionnaire and included information about the occurrence and severity of eight topographies of self-injurious behavior within the past month. Additional information includes reports of children’s cognitive functioning, language ability, and social and communication impairments.
Results:

Results showed that most of the children in the sample (75.2%) were reported to engage in at least one topography of SIB and more than half (39.1%) in more than one topography, while no SIB was reported for 24.8% of the children. The most commonly endorsed topography of SIB was hitting self with body, followed by hitting self against object, skin picking, rubbing or scratching self, pulling (hair or skin), self-biting, hitting self with object, and inserting finger (eye-poking). Females were reported to have higher levels of SIB than males. In addition, lower levels of language ability were associated with higher levels of SIB.

Conclusions:

These findings expand the current literature on SIB in children with ASD. SIB was reported for a substantive majority of children in the sample and at higher levels than what has been reported in previous studies. These findings suggest that occurrence of SIB may be underestimated in samples that do not include direct assessment (e.g., caregiver report). This information is important for improving the identification of SIB and guide evidence-based intervention of self-injury in individuals with ASD.

425.315  (Poster) Examining Autism Assistance Dog Interventions in Repetitive Behaviors: A Thematic Analysis of the Literature

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Background:

Autism assistance dogs are trained to perform a variety of tasks, including interrupting certain restricted repetitive behaviors for the purpose of remediating them. Restricted repetitive behaviors, renamed by autistic self-advocates as “stims or stimming,” have been explored and discussed in the literature as problematic in certain contexts, and necessary for the individual to cope with sensory issues in other contexts. Clinicians often tend toward the former, though a growing representation of behavior analysts voice concern about intervening in stim behaviors unless they are harmful. Autistic self-advocates tend toward the latter, arguing that stim behaviors are an autonomous right of autistic individuals, provided that the behaviors are not destructive. At present, no literature directly examines the purpose or specific training of assistance dog interventions in stim behaviors and the outcomes for individuals whose repetitive stim behaviors are remediated by an assistance dog.

Objectives:

This study aims to identify what constitutes undesirable stim behaviors in the literature that would justify targeted assistance dog intervention. This study further aims to investigate whether any positive or negative outcomes have been identified specifically in association with assistance dog interventions of repetitive stim behaviors.

Methods:

17 published studies addressing repetitive stim behaviors, 8 studies on disability assistance dogs, and 5 studies on autism assistance dogs have so far been examined together for evidence relevant to quality-of-life outcomes for autistic individuals, their caregivers, or families. The aims and methods have been reviewed, with open and axial coding applied to the findings, limitations, and conclusions to generate concepts and categories for a thematic analysis of the literature.

Results:

An analysis of the synthesized literature suggests that no evidence exists to demonstrate that assistance dog interventions in repetitive stim behaviors positively or negatively impact the autistic individual’s quality of life. Quality of life for families of autistic children has demonstrably improved due to autism assistance dog interventions, however, no evidence exists that the dogs’ intervention in repetitive stim behaviors contributes to this improvement. Furthermore, long-term outcomes of interventions in stim behaviors for the individual have not been considered. Evidence was found that varying standards of knowledge and expertise exist within general disability assistance dog training programs and facilities, further complicating the discussion on what procedures are appropriate specifically within the domain of autism assistance dog training.

Conclusions:

This study examines a variety of factors behind determining what kind of repetitive stim behaviors are unacceptable and justify assistance dog interventions. A link between undesirable behaviors as outlined in the DSM-5 diagnostic criteria for autism and the training of autism assistance dogs to mitigate these behaviors is strongly implied in the current literature, with no attention to physical, emotional, or
psychological outcomes for the individual whose stim behaviors are interrupted. More attention is needed both to the purpose of training assistance dogs to interrupt stim behaviors and to the specific short and long-term outcomes of this type of intervention.

425.316 (Poster) Examining Data Loss and the Pupillary Light Reflex As a Function of Sensory Sensitivities in Children with and without ASD: Results from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT)  
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Background: The pupillary light reflex (PLR) is a promising biomarker for autism spectrum disorders (ASD) given its direct linkage to neural mechanisms of arousal, sensation, and behavioral activation. However, the standard PLR experimental presentation, a bright flash of light, may be aversive and lead to selective data loss in autistic participants with more sensory sensitivities. This phenomenon causes current research to reflect only a subset of autistic individuals, potentially underrepresenting the utility of the PLR as a biomarker for ASD. The present study examined whether sensory sensitivities predict subsequent lost data in PLR experiments.

Objectives: We predicted that heightened sensory sensitivities would be predictive of missing data (ETLoss), and that participants with increased sensitivities would learn to anticipate and subsequently avoid (close their eyes, look away) PLR-trials over time (PLRLoss). Additionally, the relationship between sensory sensitivities, PLRLoss, and PLR-latency was examined. We predicted that participants with heightened sensory sensitivities and more PLRLoss would have longer PLR-latency (time from flash to pupillary constriction). Overall, these patterns were expected to persist over time.

Methods: Data from 277 autistic and 119 typically developing (TD) children (ages 6-11) was collected through the Autism Biomarkers Consortium for Clinical Trials (ABC-CT). All participants completed eye-tracking paradigms and clinical assessments across three timepoints (6-week and 6-month delay). Sensory sensitivities were determined using t-scores from the PDDBI: Sensory Subscale. Each visit included two sessions of eye-tracking, each containing nine PLR-trials. Each PLR-trial consisted of a (133ms) flash, followed by a dark screen. Data quality and dependent measures (PLR-latency) were determined by manual coding. Regression models examined relationships between PLRLoss, sensory sensitivities, and PLR-latency.

Results: Overall, autistic children had greater PLRLoss (M=56% valid, p<.001), ETLoss (M=88% valid, p<.001), sensory sensitivities (M=46.73, p<.001), and latency (M=284.38, p<.001) than TD children (Mblaze=69% valid; Mlatency=94% valid; Mlatency=36.02; Mlatency=280.73). Both autistic and TD children demonstrated increased PLRLoss over time, both within (r=−9.92, p<.001) and across (r=−12.74, p<.001) timepoints. Increased sensory sensitivities in ASD predicted greater PLRLoss (F(1, 1585)=21.17, p<.001), and this pattern persisted within (r=−4.60, p<.001) and across (r=−11.88, p<.001) timepoints. Finally, greater sensory sensitivities predicted longer PLR-latency (F(1, 7988)=36.41, p<.001). Ongoing analyses will explore these data using a mixed effects framework.

Conclusions: Consistent with previous research, autistic children demonstrated longer PLR-latencies, more lost data, and greater sensory sensitivities than TD children. All participants lost more data over time. These findings suggest that children experience the flash as aversive, are predicting when it will come, and are looking less at the screen during the PLR-paradigm, resulting in fewer valid trials over time. Additionally, autistic children with more sensory sensitivities had fewer valid PLR-trials and longer PLR-latencies on remaining trials than those with fewer reported sensitivities, a relationship that also persisted over time. These data suggest current research about group differences between ASD and TD children may therefore be underrepresenting the strength of biomarkers, like PLR because data loss is greatest in the populations for which these biomarkers are most representative.

425.317 (Poster) Examining the Relationship between Sensory Hyperreactivity, Hyporeactivity, and Seeking on Adaptive Behavior in Children on the Autism Spectrum  
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Background:

Sensory reactivity differences are one core feature of autism spectrum disorder (ASD) in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). The DSM-5 describes three types of sensory symptoms: hyperreactivity, hyporeactivity and seeking. Previous studies identified a relationship between overall sensory symptoms and adaptive functioning; however, few examined differences within specific domains. In addition, existing literature relies on caregiver- and self-reported symptoms. This study used the Sensory Assessment for
Neurodevelopmental Disorders (SAND) (Siper & Tavassoli, 2021), a standardized clinician-administered observational assessment and corresponding caregiver interview, to quantify sensory hyperreactivity, hyporeactivity, and seeking across visual, tactile, and auditory modalities compared to a standardized adaptive behavior assessment.

Objectives:

To examine the relationship between sensory hyperreactivity, hyporeactivity, and seeking on adaptive behavior.

Methods:

Participants included 104 children between the ages of 2 and 12 years old (6.52± 2.71) who met DSM-5 criteria for ASD (87 male) based on a consensus diagnosis which included a clinical interview and the Autism Diagnostic Observation Scale, Second Edition (Lord et al., 2012). Participants were administered the SAND and the Vineland Adaptive Behavior Scales Survey Interview Form, Second Edition (Sparrow et al., 2005). Higher scores on the SAND are indicative of a greater number of sensory reactivity symptoms; lower standard scores on the Vineland-II are indicative of poorer functioning. Pearson correlation coefficients were calculated to examine the relationship between the two measures.

Results:

Significant correlations were identified between SAND Total Score and the Vineland-II Adaptive Behavior Composite (ABC) as well as all four Vineland-II domains (Communication, Daily Living, Socialization, Motor – for age 6 and under, n=79) (r’s =-.404 to -.525; p’s<.05). Within SAND domains, Total Hyperreactivity was not significantly correlated with any Vineland-II domains nor the ABC. SAND Total Hyporeactivity scores were significantly correlated with Vineland-II Communication (r=.419, p<.001), Daily Living Skills (r=.338, p<.001), Socialization (r=.423, p<.001), and Motor (r=.222, p=.049) scores as well as the ABC (r=.402, p<.001). Similarly, SAND Total Seeking scores were significantly correlated with Vineland-II Communication (r=.402, p<.001), Daily Living Skills (r=.339, p<.001), Socialization (r=.453, p<.001), and Motor (r=.476, p<.001) scores and the ABC (r=.420, p<.001). An analysis of SAND subdomains indicated that the Vineland-II ABC was significantly correlated with Visual Hyperreactivity, Hyporeactivity, and Seeking (r’s=.213 to -.283; p’s<.05), Tactile Hyperreactivity and Seeking (r’s=.214, -.315; p’s<.05), and Auditory Hyporeactivity and Seeking (r’s=.374, -.407; p’s<.05). Tactile and Auditory Hyperreactivity were not correlated with overall adaptive behavior.

Conclusions:

Results indicate a moderate to strong relationship between adaptive behavior and overall sensory hyporeactivity and seeking, but not hyperreactivity. Specifically, poorer adaptive functioning was associated with a greater number of hyporeactivity and seeking symptoms across visual, tactile, and auditory modalities. Interestingly, visual hyperreactivity was the only hyperreactivity subdomain associated with adaptive behavior. Understanding the relationship between specific sensory reactivity differences and adaptive behavior may offer clues into underlying mechanisms and ultimately inform the development of novel targets for the treatment of sensory reactivity and adaptive behavior challenges. Treatments targeting specific sensory reactivity differences may lead to improved adaptive functioning.

**425.318 (Poster) Fast but Not Slow Force Development Is Impaired in Autism**

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**Background:** Individuals with autism spectrum disorders (ASD) show specific difficulties in producing and modulating the initial muscular forces required for a given action (Elliott et al., 2020; Foster et al. 2020; Glazebrook et al. 2006). This initial planning behaviour influences downstream visuomotor processing associated with limb control, and while feedback corrective processes have been shown to be operational during force production tasks, the forces produced are less accurate and more variable throughout sustained contractions (Mosconi et al., 2015). Here, we examined how changes in the rate of force development affect force production during ankle flexion contractions in ASD.

**Objectives:** (1) To examine force production in ASD

**Methods:** Thirteen autistic (mean age: 10.7 (1.4) years; 2 female) and thirteen matched neurotypical (mean age: 11.8 (1.9) years; 2 female) children volunteered for the study, which was approved by the local ethics committee. After measuring children's maximal voluntary contraction (MVC) force during ankle flexion they completed two blocks of ramp contractions: Fast Ramp (20% MVC/s) and Slow Ramp (5% MVC/s). Each contraction can be separated into 3 distinct phases: (i) Recruitment (2s duration in Fast Ramp, 8s in Slow Ramp); (ii)
Results: Overall, ASD force production was less accurate (AE) and more variable (TP; p< 0.01). Specific differences between the two groups were shown for the Recruitment phase of the Fast Ramp contractions. During this phase, ASD children showed significantly greater AE and TP (p < 0.05) in comparison to neurotypical children. In contrast, there was no specific differences during the Recruitment phase of the Slow Ramp contractions, or between the groups during the Sustain and Derecruitment phases for either contraction (p > 0.05).

Conclusions: The current findings support previous research that force production is less accurate and more variable in ASD. Furthermore, the presence of group differences during the recruitment phase of Fast Ramp but not Slow Ramp contractions (nor during the Sustain and Derecruitment phases of Fast and Slow Ramp contractions) suggests a specific problem with the rate of force development. The current findings may help explain why individuals with ASD typically take longer to prepare and execute movements (Glazebrook et al. 2006) and have relevance when discussing how feedforward and feedback motor control combine to impact social behaviours in ASD.

Background: Toe walking is a clinical motor sign present in 20% of individuals with autism spectrum disorder (ASD). Because this behavior is also found during standing or running, the term tip-toe behavior (TTB) seems to be more appropriate. A systematic review found a lacking of studies that quantify TTB in individuals with ASD. The most used and reliable instrumental tool to quantify motor deficit during standing and walking is the gait analysis, but this approach requests the positioning of a large number of markers on the skin of the patient, a long time to prepare the patient for the execution of the test and is conducted in a non-ecological setting. For all these reasons gait analysis could be difficult to use with individuals with severe ASD because of their clinical condition. Thus, a simpler instrumental approach that uses wearable sensors usable in an ecological setting could be a useful resource to quantify TTB in individuals with severe ASD.

Objectives: The aims of this pilot study are: 1) to verify the feasibility and acceptability of wearable sensors in individuals with severe ASD; 2) to quantify TTB using wearable sensors during structured standing and walking tasks.

Methods: Subjects with ASD diagnosed according to DSM-5 criteria and confirmed using the Autism Diagnostic Observation Schedule were admitted to the study. TTB was quantified using “Sensoria® Smart Socks” (SSS), a commercially available wireless gait monitoring technology (Figure 1). SSS was found a valid measure instrument in a previous study. To assess the TTB quantity during standing and walking we used a static and dynamic test following the methodology proposed in a previous study. The static test consisted in playing while standing in front of a table for 3 minutes. The dynamic test consisted in transporting 1 object (puzzle, Lego®, ...) from the therapist while standing in front of a table for 3 minutes. The dynamic test consisted in transporting 1 object (puzzle, Lego®, ...) from the therapist to the playing table situated 2 meters away and back again 15 times. The test is conducted without shoes albeit with SSS. The same person was tested three times on three different days (9 acquisitions). The data acquired from the SSS were elaborated from a dedicated algorithm. The result of the dynamic test is presented as the mean percentage number of toe steps and the result of the static test is reported as the mean percentage of seconds in TTB.

Results: Three individuals with severe ASD and TTB were assessed. Their age was 10.9yrs, 12.8yrs and 13yrs (3/3 males) and their ADOS CSS was 9, 10 and 8, respectively. We found the SSS was feasible and acceptable in the three individuals with severe ASD and TTB in all three trials. We were also able to quantify TTB during both the static and the dynamic tests using the SSS tool in 9/9 of the acquisition (100%) (example in Figure 2).

Conclusions: “Sensoria® Smart Socks” seems to be a feasible and acceptable wearable sensors approach for quantifying TTB in individuals with severe ASD and TTB. Further research is required to confirm these preliminary results.

425.319 (Poster) Feasibility and Acceptability of Using Wearable Sensors to Quantify Tip Toe Behavior in Individuals with Severe Autism Spectrum Disorder: Preliminary Results

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Background: Sensory processing involves recognising and regulating sensory information as well as responding appropriately (Gourley et al., 2012). Sensory processing difficulties can occur in autistic children and they tend to be more sensory seeking than neurotypical (NT) children (Tomcheck & Dunn, 2007). Fidgeting occurs in children who are sensory-seeking (Ben-Sasson et al., 2009) and it has been suggested that suppressing fidgeting hinders children’s ability to thrive in a classroom environment (Lengel & Kuczala, 2010). Occupational therapists and educational psychologists have introduced fidget toys to serve as coping mechanisms for addressing sensory needs (Benson et al., 2018). Nevertheless, there are a very limited number of studies investigating fidget toy use in autistic children. Ledford et al. (2020) found children’s engagement in the classroom did not improve and their focus was on manipulating the fidget toy rather than attending to the teacher. However, Fletcher-Watson and May (2018) found fidget toys can reduce anxiety in other settings.

Objectives: There is an ongoing debate about the benefits and risks of using fidget toys as there is insufficient evidence to suggest whether fidget toys help or hinder children’s emotional wellbeing and academic progress and how this may relate to children’s sensory profiles. The current study addresses this gap by examining the perspectives on fidget toys and fidget spinners in parents of autistic children and NT children. This study investigated whether fidget toys and fidget spinners contribute positively or negatively to the behaviour and emotional outcomes of children. The relationship between children’s sensory-seeking scores and parental views about fidget toys was also investigated.

Methods: 129 parents/carers of children (aged 3-16, M= 9 years, 3 months) with an autism diagnosis (n = 53) or NT children (n= 76) completed an online survey. The survey consisted of questions relating to their own child’s use of fidget toys and specifically fidget spinners as well as the perceived benefits (e.g., improves concentration, reduces anxiety) and risks (e.g., distraction, harmful). Parents also completed the Sensory Profile questionnaire 2 to obtain perspectives about their child’s sensory behaviours.

Results: Findings demonstrated that parents of autistic children perceived both fidget toys and fidget spinners to be more beneficial than NT parents, especially in relation to reducing anxiety. They perceived fidget toys as improving their child’s concentration more than parents of NT children. Higher sensory-seeking scores in autistic children were associated with greater parental agreement for fidget toys and fidget spinners being beneficial, for fidget toys reducing anxiety and being less harmful, and for fidget spinners being less distracting.

Conclusions: In summary, parents of autistic children perceived fidget toys to be overall more beneficial for their child, improving concentration and reducing anxiety compared to NT parents. Implications include that educators should consider parental views when forming policies about the use of fidget toys in schools. Findings also imply that the sensory profiles of autistic and NT children should be considered in relation to the use of fidget toys.

425.321 (Poster) From “One Big Clumsy Mess” to “a Fundamental Part of My Character.” Autistic Adults’ Experiences of Motor Coordination
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Background:

Altered motor coordination is common in autistic individuals affecting a range of movements such as manual dexterity, eye-hand coordination, balance and gait. However, motor coordination is not routinely assessed leading to motor coordination difficulties remaining undiagnosed and untreated, particularly in autistic adults. This situation has arisen partly because autism research has focussed on social functioning, but another reason may be because a rich description of coordination difficulties and their impact from the viewpoint autistic people is lacking. Therefore, the current study used qualitative methods to document the experience of motor coordination difficulties from the viewpoint of autistic adults.

Objectives:

Focus groups were conducted with autistic adults in order to understand how they experience and describe motor coordination across their life span, the impact of motor coordination issues on daily living skills, social and emotional wellbeing and their experiences of learning new motor tasks and using strategies.

Methods:

17 autistic adults (19 to 67 years; mean 53.7 years; 5 female) took part in five focus groups conducted either via Zoom video or text chat. The facilitator followed a semi-structured schedule that was developed through discussion with members of the Autism@Manchester expert by experience group. Reflexive thematic analysis was used, following the 6 step technique advocated by Braun and Clarke. The COREQ (COnsolidated criteria for REporting Qualitative research) Checklist was completed.
Results:

Four main themes were identified. First, motor coordination difficulties were pervasive and variable, being present life-long and affecting multiple types of movement and many aspects of life. However, the nature of the difficulties was variable within and between participants along with differing awareness of their own ability. Second, participants described motor coordination as an active process, requiring concentration for most actions and at a level seemingly greater than other people. Sensory issues were closely entwined with movement difficulties, making movement more challenging. Third, motor coordination difficulties impacted upon social and emotional wellbeing by placing strain on relationships, prompting bullying and exclusion, putting safety at risk and causing a range of negative emotions. Fourth, participants described multiple learning and coping strategies in the absence of any support.

Conclusions:

Findings highlight that it is essential to address the current lack of support for motor coordination difficulties in autism considering the significant social and emotional consequences described by our participants. Further investigation of motor learning and interactions between sensory and motor performance in autistic adults is also warranted.

425.322 (Poster) Gathering Autistic Adult’s Visual Sensory Experiences: A Qualitative Interview Study

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Background:

Altered sensory processing is widely recognised in autism and reported to interfere with daily function and quality of life. However, there is limited understanding of the personal sensory experiences of autistic individuals across the lifespan, particularly relating to visual stimuli. Increased awareness of visual sensitivities and preferences is important if environmental adaptations are to be meaningful for autistic individuals.

Objectives:

To qualitatively explore autistic adults' visual sensory experiences with a view to informing environmental adaptations.

Methods:

Twenty autistic adults aged between 18-89 years were recruited primarily via social media (70% identified as female). Semi-structured interviews, lasting on average around 60 minutes, were conducted online. Participants also completed a short, online survey with demographic and autism diagnosis questions and the AQ10. Reflexive, thematic analysis was used to analyse the interview data, with adherence to Braun and Clarke’s six-step framework for thematic analysis.

Results:

Emerging themes included hypersensitivity, altered face processing, coping strategies and desired adaptations. Although the emergence of clear themes reflected shared experiences in response to visual stimuli (for example hypersensitivity), within themes individual experiences were nuanced (such as sensitivity to specific types of lighting, colour, visual clutter, and motion). Natural and artificial light sensitivity were widely endorsed: “... sunshine is my biggest issue. I am extremely light sensitive”; “I have a real issue with fluorescent lights. Even when I close my eyes it’s like they’re burning my eyes.” Regarding face processing, the majority of participants reported difficulties with facial recognition: “I have no facial recognition at all”. Conversely, a few participants described significant strengths in this area: “I usually recognise people who I haven’t see for 15 years...”, highlighting significant inter-individual differences. Most participants expressed an aversion to eye contact: “... eye contact is quite excruciating... that's something I definitely avoid”. Findings revealed the considerable impact for some individuals of visual sensory experiences on physical and mental well-being: “Certain kinds of lights like fluorescent lamps, light, make me feel like hot and sweaty, and nauseous and that kind of thing...”. However, some visual stimuli were reported to have a positive effect on mood, including natural moving patterns such as waterfalls and candle flames. Several coping strategies employed to reduce negative impact were described: “So, I use sunglasses or a hat, so I don’t have the light coming straight into my eyes”. Desired adaptations emphasised the importance of designing work and community spaces in consultation with autistic individuals alongside a need for improved understanding across contexts of visual sensory sensitivities.

Conclusions:
This study provided detailed information on the visual sensory experiences of autistic adults. By providing valuable insight into the impact of visual stimuli on overall well-being, this research highlights a need for greater community awareness of visual sensory differences and for environmental adaptations. Findings also stress the importance of understanding individual needs and preferences within broader visual sensory themes.

425.323 (Poster) Grapheme-Color Synesthesia in Autistic Adults

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Background: People experiencing synesthesia report that sensory input in one modality, such as the name of a letter or number, triggers another sensory experience (such as a specific color; Eagleman et al., 2007). Synesthesia is reported as more prevalent in autism spectrum disorder (ASD) than in the general population (Baron-Cohen, 2013), and may be associated with autistic traits and sensory sensitivities in particular (Leeuwen et al., 2021).

Objectives: The current study probes the prevalence of grapheme-color synesthesia in ASD, and the consistency of grapheme-color associations. We also examine synesthesia’s association with autistic symptomology and circumscribed interests.

Methods: 198 autistic and non-autistic (NA) adults (167 after rule-outs) completed an online Prolific survey; Table 1. Autistic/NA groups did not differ in age, gender, or race/ethnicity. Participants completed the Autism Spectrum Quotient Questionnaire (AQ) and answered questions about demographics, color/grapheme associations, and circumscribed interests (using a modified version of the Yale Special Interests Survey, YSIS). Each participant completed a synesthesia assessment, in which they were presented with graphemes A-Z and 0-9 in a randomized order, twice each. Participants clicked on a color-wheel representing Red, Green, Blue (RGB) values in two dimensions, identifying the best match for each grapheme. The RGB Euclidean distance formula, adapted for a two-trial condition, was used to calculate color distance (CD) scores. Lower CD scores indicate greater response consistency, and the threshold of 0.32 and lower represents the cut-off for grapheme-color synesthesia.

Results: Some 20% of the ASD group (24/120) self-reported the experience of grapheme-color associations, compared to 11% (5/47) of the NA group; the difference was not significant, \( p = .15 \). There were also no differences in CD-based synesthesia performance: 13% (16/120) of the ASD group versus 15% (7/47) of the NA group scored below the CD threshold, \( p = .92 \). In the ASD group, 6% (7/120) scored below the synesthesia CD threshold and reported synesthesia. Across these seven “true” synesthetes, the majority had highly consistent scores for 0, 2, 4, 5, 6, 9 and B, H, M, R, T, Z. One participant described letter associations as follows: “vowels have very warm tones, consonants have bright sharp colors.” In the NA group, 4% (2/47) scored below the synesthesia CD threshold and reported synesthesia. Across autistic and NA groups, CD and AQ scores were negatively correlated, \( r(165) = -.21, p = .007 \); Figure 1.

Conclusions: Results suggest an increased prevalence of self-reported synesthesia in autism, though there was no difference in objectively-measured synesthesia between groups. However, there was a significant relationship between autism traits and grapheme-color synesthesia. We will discuss implications for sensory processing in ASD.

425.324 (Poster) Informant Discrepancy of Intolerance of Uncertainty Predicts Restricted and Repetitive Behaviors

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Background: Restricted or repetitive behaviors or interests (RRBIs) are a hallmark of autism (APA, 2013) and are often characterized as challenging or disruptive by parents (South et al., 2005). Scholarship suggests that RRBIs may be related to intolerance of uncertainty (IU)—a facet of anxiety—which is the inability to tolerate unwanted effects triggered by perceived lack of information (Carleton, 2016). IU is more frequently observed in autistic than non-autistic youth (Vasa et al., 2018), and RRBIs may be overt manifestations of IU resulting from attempts to impose sameness (Rodgers et al., 2012). Integrating multiple informants in assessment of IU is important because parents may be limited by reliance on observable behavior, while children may struggle with introspection (Storch et al., 2012). Compared to single-informant report alone, informant discrepancy, which is the degree of divergence between reporters, can provide additional information regarding child psychopathology, including autism (Lerner et al., 2012). While difference scores have historically been used to calculate informant discrepancy, polynomial regression seems more appropriate when examining child psychopathology (Laird & De Los Reyes, 2013). The link between RRBIs and IU in autism has garnered attention recently, and this novel analytic approach in assessing informant discrepancy may offer insight into this nuanced relationship.

Objectives: We examined the predictive power of informant discrepancy between child- and parent-reported IU on RRBIs. We hypothesized that (1) higher child- and parent-reported IU would each predict more RRBIs, and that (2) the degree of child-parent informant discrepancy in IU would also significantly predict RRBIs.
Methods: Thirty-four autistic and non-autistic youth (61.8% male; \( M_{\text{age}} = 10.24, SD_{\text{age}} = 3.16; 58.8\% \) White; \( M_{IQ} = 112.41, SD_{IQ} = 20.22 \)) and their parents completed a measure of IU (IU subscale of the Anxiety Scale for Children-Autism Spectrum Disorder [ASC-ASD; Rodgers et al., 2016]). Parents also completed the Repetitive Behavior Scale – Revised (RBS-R; Bodfish et al., 1999) on their children’s RRBIs.

Results: Parent-reported IU, but not child-reported IU, was associated with RBS-R (see Table 1). Polynomial regression indicated that the linear interaction between child- and parent-reported IU was a predictor of total RBS-R score in addition to parent-reported IU. The interaction was interpreted with child-reported IU as the moderator, reflecting parent-reported IU more strongly relates to RBS-R score at high (\( b = 3.38, SE = .72, p = .001 \)) and mean (\( b = 1.87, SE = .50, p = .009 \)) levels of child-reported IU, but not at low levels (\( b = .35, SE = .62, p = .58 \); see Figure 1). This pattern indicates that the congruence of high parent-reported IU and high child-reported IU is associated with the highest levels of RRBIs.

Conclusions: Above and beyond what parent-reported IU accounts for, findings suggest the degree of agreement/discrepancy between child and parent explains unique variance in RRBIs, such that RRBIs may be most pronounced when informants agree on the severity of IU. These findings reaffirm the need to consider multiple informants’ perspectives, especially when considering child psychopathology (De Los Reyes et al., 2015). Overall, considering informant discrepancy, specifically with this polynomial regression approach, presents a more nuanced understanding of the relationship between covert experiences, such as IU, and overt behaviors, such as RRBIs.

425.325 (Poster) Internalizing and Externalizing Symptomatology in Autistic Youth: The Role of Sensory Processing
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Background: Sensory processing difficulties are a common feature of autism, with up to 95% of caregivers of autistic youth reporting that their child shows some degree of atypical sensory behavior. Research has shown that autistic youth who exhibit difficulties in sensory processing may be more likely to demonstrate internalizing and externalizing problems. However, less is known about the specific domains of sensory sensitivity that may be associated with such symptomatology. This highlights the need for research that investigates which sensory sensitivities in particular are most strongly related to internalizing and externalizing behaviors in autistic youth.

Objectives: To assess how various sensory processing domains are related to internalizing and externalizing symptomatology in autistic youth.

Methods: Participants included 57 autistic youth aged 2-11 years (\( M_{\text{age}} = 5.53, SD_{\text{age}} = 2.46; 84\% \) male) whose caregivers completed the Short Sensory Profile (SSP) and Child Behavior Checklist (CBCL). A series of hierarchical linear regressions were conducted. Five separate models were run with each CBCL domain (anxious depressed problems; aggressive behavior; anxiety symptoms; ADHD symptoms; oppositional defiant symptoms) as the outcome. All results of model comparisons are reported after entering covariates of age and IQ, followed by SSP domains (tactile sensitivity; taste/smell sensitivity; movement sensitivity; under-responsive/seeks sensation; auditory filtering; low energy/weak; visual/auditory sensitivity) as predictors. Lower SSP scores indicated greater sensory processing difficulties.

Results: Results for anxious/depressed problems indicated that 38% of the variance was explained by sensory processing (\( \Delta R^2 = .38, \Delta F(1,42) = 5.50, p = .001 \)), specifically, movement sensitivity (\( \beta = -1.54, p = .006 \)). For aggressive behavior, 37% of the variance was explained by sensory processing (\( \Delta R^2 = .37, \Delta F(1,42) = 5.70, p < .001 \)), specifically, movement sensitivity (\( \beta = -1.38, p = .019 \)) and under-responsivity/sensation-seeking (\( \beta = -1.60, p = .018 \)). Regarding the DSM-5 Oriented CBCL scales, for anxiety symptoms, sensory processing explained 35% of the variance (\( \Delta R^2 = .35, \Delta F(1,41) = 3.83, p = .004 \)), specifically sensitivity to taste/smell (\( \beta = -.61, p = .036 \)). For ADHD symptoms, sensory processing explained 50% of the variance (\( \Delta R^2 = .50, \Delta F(1,41) = 12.40, p < .001 \)), specifically under-responsivity/sensation-seeking (\( \beta = -.74, p < .001 \)) and auditory filtering (\( \beta = -.47, p = .036 \)). Finally, sensory processing explained 22% of the variance in oppositional defiant symptoms (\( \Delta R^2 = .22, \Delta F(1,43) = 3.50, p = .015 \)), specifically, movement sensitivity (\( \beta = -1.10, p = .045 \)).

Conclusions: This study shows that a number of sensory processing domains have strong associations with both internalizing and externalizing symptomatology in autistic youth, accounting for 22-50% of the variance, even after controlling for age and IQ. Moreover, these symptoms may be associated with specific patterns of sensory issues. Future research is needed that explores how specific sensory processing patterns may increase internalizing and externalizing concerns among autistic youth. This study underscores the importance of identifying strategies that can be used to support youth with a range of sensory processing difficulties in home, school, and community settings, with the goal of ameliorating emotional and behavioral challenges faced by these individuals.

425.326 (Poster) Investigating Action Perception, Imagery and Execution in Autistic and Non-Autistic Individuals
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Background: Performing and observing others’ actions is crucial for successful communication, social interaction, and navigating our environment. The ideomotor or common coding theory is based on the premise that there is a close relationship between the sensory and motor systems. Accordingly, the neural codes that are engaged during action execution are also engaged in action perception. Motor imagery (imaging movement) may also activate neural areas involved in execution. As motor coordination difficulties occur in ~80% of autism, it is possible that dysfunctional perception-action codes may contribute to reduced ability to perform actions as well as perform imagery and perceive (recognise and interpret) the actions of others. One method of comparing execution, imagery, and perception is using the Fitts Law task where participants are asked to perform, imagine, or watch hand movements between targets that vary in width and distance. According to the Fitts Law relationship, movement duration is longer when the movements are more difficult - targets are smaller and further apart. Findings in non-autistic individuals show that movement duration increases with difficulty level for movement perception, imagery, and execution, demonstrating similar processing. To date, no previous studies have compared action perception, imagery, and execution in autism.

Objectives: This project was designed to examine whether autistic individuals are able to use motor imagery and further investigate whether executing, perceiving, and imagining hand movements differs between autistic and non-autistic adults.

Methods: Methods and analysis were pre-registered. Autistic (n=20) and non-autistic (n=20) participants were asked to complete execution, imagery, and perception tasks with their dominant hand during an online experimental session. The execution task required participants to move their index finger between two targets on the screen. The imagery task used the same procedure, but asked participants to imagine making the movements and indicate when they had finished. For the perception task, participants were asked to watch an animation of a finger moving between the targets (which varied in speed across trials) and indicate whether they could perform the presented movement. Target size and distance were systematically varied across trials in all tasks to manipulate difficulty. Altered imagery, perception, or execution processes in the autistic group would be apparent as a lack of, or reduced positive correlation, between movement duration and difficulty level. Furthermore, if motor imagery is altered in the autistic group, a larger difference in movement duration between execution and imagery conditions will be apparent compared with the non-autistic group.

Results: A similar Fitts Law relationship was present in both groups demonstrated by a significant positive correlation between movement time and difficulty in all three tasks. This result indicates that autistic individuals are using simulation for imagery and perception. As with previous work in non-autistic individuals, movement times were significantly longer in the imagery condition than in the execution and perception conditions which did not differ between the groups.

Conclusions: The results are consistent with ideomotor accounts of action perception and imagination, and indicate that the processes of motor imagery and simulation may be relatively intact in autistic individuals.

425.327 (Poster) Is Visual Sensitivity Coupled to Superior Visual Search in Children and Adolescents with Autism Spectrum Disorders?

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Background:

Children with Autism Spectrum Disorders (ASD) have a high prevalence of sensory sensitivity. Children with ASD often display superior detection of subtle perceptual target features hidden among distractors in visual search paradigms when compared to their typically developing peers. Other lines of evidence however, show that children with ASD are sensitive to environments with high perceptual complexity and sensory noise.

Objectives:

The present study addresses how the superior ability to identify subtle visual features is associated with visual sensitivity to perceptual complexity in ASD, and whether superior visual search and sensitivity to perceptual complexity is associated with autistic traits and daily functioning in children and adolescents with ASD.

Methods:

The present study used a novel visual search task to investigate search times for identifying a target hidden among distractors. Each target and distractor were made up of five visual features, which could be similar or differ from each other in shape and colour. The target was
more perceptual subtle by lowering the number of visual features that made up the target. If the visual features of the target were dissimilar so were the distractors and the perceptual complexity of the visual environment was therefore high and noisy. We hypothesized that children and adolescents with ASD aged 7–14 years (n=59) would display shorter search times in homogenous environments with few signal features compared to typically developing controls (n=59). Inversely, we hypothesised that children with ASD would have longer search times than controls when perceptual complexity was high. Parents answered the Autism Spectrum Rating Scales (ASRS) and Behaviour Rating Inventory of Executive Functions (BRIEF-2) to examine if group differences in search times were associated with autism traits and daily level in executive functioning, respectively. Our hypotheses were tested with repeated measures ANCOVA and multiple linear regression models corrected for age, sex, parental education and intellectual ability.

Results:

Across all children, search times got longer with fewer signal features present and with increasing perceptual complexity (p<0.001). A significant interaction between groups and conditions (p=0.004) confirmed our hypothesis, as children with ASD displayed superior search times in conditions with few signal features and low perceptual complexity (p=0.0012). In contrast, the control group had shorter search times than the ASD group in conditions with high perceptual complexity (p=0.001). Those children who displayed superior search times for subtle target features in contrast had slower search times in conditions with high perceptual complexity (p<0.001), both of which was related to reduced executive functioning and more autism symptoms (p<0.05).

Conclusions:

Superior visual search in children and adolescents with ASD was coupled to their visual sensitivity to more perceptual complexity, which negatively seem to affect their otherwise superior detail-oriented style. This processing style may interfere with the daily lives and functioning of children with ASD.

425.328 (Poster) Kinematic and Force Control Features in Autistic Adults during Curvilinear Movements
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Background: Motor challenges have been reported in 87% of autistic children (Bhat, 2020) and may persist into adulthood (Cho et al., 2022), which could underpin autistic social difficulties. Kinematic differences between individuals with autism spectrum disorders (ASD) and typical development (TD) have been reported across activities. The two-thirds power law (2/3 PL) defines the relationship between moving speed and the curvature of moving path. Different adherence to 2/3 PL was observed in autistic children (Fourie et al., 2022), but not yet tested in autistic adults. Additionally, force modulation is affected in autistic individuals (Shafer et al., 2021). Force quantification during the 2/3 PL task can help further understand autistic motor regulation during the task. This contributes to the computational characterisation of ‘autism motor signature’ (Anzulewicz et al., 2016), leading to a better understanding of motor challenges and required support in autism.

Objectives: Quantify the kinematic and force control features in autistic adults during curvilinear movements, and to test if these differ from their TD counterparts.

Methods: Nine autistic and twelve typically developing adults (age ranged 19–57 years) participated in this study. Participants used a stylus (Apple Pencil) to trace and draw ellipses on a smart tablet (iPad Pro 11-inch) while timestamped on-screen trajectory and force data were recorded. An elliptical path was shown on screen for tracing while an empty canvas was provided for drawing ellipses (Figure 1). Each participant performed 5 trials of tracing and then 5 trials of drawing activities. Each trial lasted around 15 seconds. The longest continuous movement was extracted from each trial for further analyses. The radius of curvature and tangential velocity were computed to give the $\beta$ value (Tangential Velocity = $K \times$ Radius of Curvature ) representing adherence to 2/3 PL. Force data were first normalised by the maximum value of the trial and then averaged, indicating the average ratio of force applied with respect to the maximum force. Kolmogorov-Smirnov test was used to compare the distributions of kinematic and force variables between ASD and TD movements.

Results: In comparison to typically developing adults, autistic adults demonstrated greater deviation from the 2/3 PL ($\beta=0.333$) in both tracing (ASD Mdn=.302, TD Mdn=.323, p=.010) and drawing (ASD Mdn=.306, TD Mdn=.323, p=.002) activities (Figure 2a). In addition, autistic adults applied greater normalised force in both tracing (ASD Mdn=.501, TD Mdn=.452, p=.038) and drawing (ASD Mdn=.498, TD Mdn=.453, p=.032) activities than their typically developing counterparts (Figure 2b).

Conclusions: This study revealed the kinematic and force control differences in autistic adults during ellipse tracing and drawing activities. These differences could lead to an impact on their quality of life as curvilinear movements are essential in daily life activities such as writing, ball throwing, and turning a car wheel. Understanding motor control differences may help develop intervention plans to overcome motor challenges and hence improve life quality. Furthermore, these motor control differences may be related to their brainstem function (Delafield-Butt & Trevarthen, 2018). This research paradigm could support future investigations on the relation between motor features.
**425.329 (Poster) Longitudinal Analysis of Sensory Responsivity from Infancy to School Age in Children at High and Low Familial Likelihood for Autism**


Background: Empirical evidence regarding the development of sensory responsivity in young children at high likelihood to develop autism spectrum disorder (ASD) remains relatively limited. Due to this gap in research, it is unclear how sensory responsivity behaviors such as hypo-responsivity, hyper-responsivity, and sensory seeking may change over time and impact later developmental outcomes. Of the limited studies examining the development of sensory features, many are restricted in detail given that only two assessment points were analyzed. Longitudinal analysis of sensory responsivity data from children seen multiple times builds knowledge about the developmental course of sensory responsivity, including the shape of that trajectory.

Objectives: Goals of this study were to 1) characterize developmental trajectories of sensory responsivity from infancy into school age (~12 months, 24 Months, and 6-9 years) in children at high and low familial likelihood for ASD; and 2) determine if sensory responsivity in infancy predicts adaptive and cognitive functioning at school age among children with ASD.

Methods: Generalized mixed effects models were used to examine total sensory responsivity, hypo-responsivity, hyper-responsivity and sensory seeking scores from the Sensory Experiences Questionnaire (SEQ: Baranek et al., 2006) in three groups of children, including high likelihood children later diagnosed with ASD (HL-ASD; n = 31, 81% male), high likelihood children without ASD (HL-Neg; n = 149, 58% male), and low-likelihood control children not meeting diagnostic criteria (LL-Neg; n = 94, 59% male). Hierarchical linear regression was then used to examine the association between sensory responsivity scores in infancy (~12 months) and functional adaptive on the Vineland Adaptive Behavior Scales -3 (Veland; Sparrow, Cichetti, & Saulnier, 2016) and cognitive outcomes on the Differential Ability Scales (DAS; Elliot, 1990) at school age (~6-9 years).

Results: Results of fit statistics showed that the trajectory of sensory responsivity scores was best estimated by Group (HL-ASD, HL-Neg, LL-Neg), Age, and the interaction of Age and Group. High likelihood children with ASD showed increasing total, hypo- and hyper-responsivity scores and decreasing sensory seeking scores from infancy to school age that widened over time from the groups of children without ASD. Both the high and low likelihood groups without ASD showed lower sensory responsivity scores as compared to children with a diagnosis. Additionally, early elevated hypo-responsivity scores negatively associated with later adaptive behavior (F(3, 337) = 68.18, p < .001), indicating hypo-responsivity was a significant predictor of adaptive behavior scores (β = -4.17, p < 0.001) at school age. Sensory responsivity in infancy did not predict cognitive scores at school age.

Conclusions: Overall, differences in the degrees of sensory responsivity are detectable in children’s behavioral repertoires by 12 months of age and continue to differentiate children who develop ASD by middle childhood, pointing to the importance of early detection and treatment of sensory behaviors to improve children’s functional outcomes later in life.

**425.330 (Poster) Longitudinal Associations of Restricted and Repetitive Behaviors and Hyperactivity in Children with and without ASD**

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Background: Restricted and repetitive behaviors (RRBs) are a core feature of autism spectrum disorder (ASD; APA, 2013), and additionally manifest in other neurodevelopmental disorders (Briery et al., 2021). RRBs are positively associated with hyperactivity (Avni et al., 2018), and both behaviors are related to response inhibition deficits (Barkley, 1999; Turner, 1999) and altered connectivity in similar brain areas (Estes et al., 2011; van Rooij et al., 2015), suggesting a shared neural substrate. Prior studies examined associations between these symptoms cross-sectionally but few longitudinally (Zachor & Ben-Itzchak, 2019). As RRBs and co-occurring hyperactivity result in changes for children and families, understanding their early development is crucial for tailored intervention.

Objectives: Examine in children with and without ASD: 1) concurrent associations of RRBs and hyperactivity at 3 and 5 years, 2) stability of RRBs and hyperactivity from 3 to 5 years, and 3) an exploratory aim, the longitudinal contributions of hyperactivity to RRBs and vice-versa from 3 to 5 years.

Methods: Participants included 150 toddlers with ASD (n=57) or without ASD (TD:n=54, ATP:n=39) at Time 1 (T1, Mage=39.2mo); of these children, 89 (ASD:n=34; TD:n=31, ATP:n=24) were followed prospectively to Time 2 (T2, Mage=69.9mo). RRBs were quantified...
using Social Responsiveness Scale (SRS) RRB t-scores. Hyperactivity was measured using Early Childhood Inventory (ECI-5) ADHD-Hyperactive severity scores. Data were analyzed using Pearson’s r correlations and regression analyses with T1 RRBs, hyperactivity, and group predicting T2 RRBs or T2 hyperactivity.

Results: T1 RRBs were positively associated with T1 hyperactivity in the ASD ($r=.47, p<.001$) and non-ASD groups ($r=.57, p<.001$; Fig.1A). T2 RRBs were positively associated with T2 hyperactivity in the ASD ($r=.66, p<.001$) and non-ASD groups ($r=.72, p<.001$; Fig.1B). T1 and T2 RRBs were correlated in the ASD ($r=.64, p<.001$) and non-ASD groups ($r=.80, p<.001$; Fig.1C). T1 and T2 hyperactivity was correlated in the ASD ($r=.67, p<.001$) and non-ASD groups ($r=.62, p<.001$) (Fig.1D, Table 1A). Linear regression predicting T2 RRBs revealed main effects of T1 RRBs ($\beta=.57, p<.001$), T1 hyperactivity ($\beta=.27, p=.003$), and group ($\beta = .18, p = .011$), with no significant interactions (Fig.1E). An analogous regression predicting T2 hyperactivity revealed main effects of T1 hyperactivity ($\beta=.59, p<.001$), T1 RRBs ($\beta=.44, p=.004$), and an interaction between group and RRBs ($\beta=-.29, p=.028$), though group was not significant (Fig.1F, Table 1B).

Conclusions: RRBs and hyperactivity were positively associated in children with and without ASD at ages 3 and 5, and demonstrated stability between timepoints. After controlling for severity of RRBs at 3 years, hyperactivity at 3 years predicted increased RRBs at 5 years for all children. Similarly, after controlling for severity of hyperactivity at 3 years, RRBs at 3 years predicted increased hyperactivity at 5 years for all children, though this increase was greater for children without ASD. These findings, consistent with previous research in older children, suggest the possibility of a shared underlying mechanism and motivate future studies investigating a common neural substrate. The prospective associations between hyperactivity and RRBs underscore the importance of early assessment of ADHD and ASD-related behaviors for tailored interventions.

**425.331 (Poster) Machine Learning Classification of ASC through Dyadic Social Interaction**


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**Background:**

People on the autism spectrum demonstrate a diverse range of social interaction and reciprocal communication difficulties, as reflected in a variety of diagnostic instruments. However, diagnostic clarification remains a lengthy process, with few available experts and an increasingly large number of individuals seeking consultation in adulthood. This results in a bottleneck which is further exacerbated by the lack of objective diagnostic markers. Therefore, improved and efficient diagnostic measures are critical in need. Notably, with social interaction difficulties presenting as one of the hallmark symptoms in autism, social reciprocity offers a fruitful setting for developing such markers.

**Objectives:**

The following study aimed at quantitatively capturing aspects of nonverbal social interaction in autistic adults across multiple modalities and training a machine learning algorithm for classification. Importantly, considering the interactional nature of many of the social difficulties in autism, we incorporated dyadic as well as individual attributes.

**Methods:**

28 autistic participants (mean age = 37.18, 18 females) were paired with a non-autistic participant to complete two conversational tasks (28 ASC-CONTROL dyads). Additionally, 16 CONTROL-CONTROL dyads completed the same tasks (mean age of all non-autistic participants = 31.48, 26 females). Dyads were filmed with three cameras capturing their respective facial and body movement. Videos were post-processed with OpenFace and Motion Energy Analysis (Ramseyer & Tschacher, 2011) to extract behavioral time series of activated action units (AUs) in faces, as well as changes in head and body movement. The resulting time series were cross-correlated to compute the degree of inter- as well as intrapersonal synchrony. Separate Support Vector Machine (SVM) classification models were preprocessed and trained in NeuroMiner on all participants, using features grouped according to the interaction modality (facial expression, head and body movement, intrapersonal coordination, and total movement). A stratified, nested k-fold cross-validation scheme was implemented to ensure maximum generalizability. The models as well as a stacking framework-based combination were optimized based on prediction accuracy. Additionally, model outcomes were investigated for associations with a range of clinical questionnaire measures as well as facial emotion recognition capabilities.

**Results:**
With a balanced accuracy of 79.5%, the preliminary SVM classification based on facial expression synchrony between two participants yielded the highest accuracy in predicting participants of ASC-CONTROL vs. CONTROL-CONTROL dyads, followed by the models based on total facial and body movement, and head synchrony. Overall prediction performance was not increased in the stacking model. Though autistic participants showed reduced accuracy and increased response time in a facial emotion recognition task, we found no significant associations with the facial expression model outcome. Further associations with clinical questionnaire measures, as well as important features for classification will be discussed.

Conclusions:

Our classification models were able to detect autistic social interaction characteristics with a high accuracy. Importantly, they did so based on data from a low-cost, low-barrier, scalable setup and a largely automatized analysis framework. This suggests a high usability of SVM classification models for diagnostic purposes in the clinical setting.

425.332 (Poster) Motor and Communication Delays in Infants Who Later Developed ASD and Their Relationship to Future Outcomes and Services Received: A SPARK Study Analysis.
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Background:

87% of school-age children with autism spectrum disorder (ASD) were at-risk for motor difficulties (Bhat, 2020). These difficulties were uniquely associated with certain core / diagnostic and co-occurring / general delays of children with ASD (Bhat, 2021). However, we do not know the trajectory of motor development in the first 1-3 years of life in this large SPARK study sample.

Objectives:

This analysis of SPARK study data will compare trajectories of early motor and communication delays between children with ASD and their unaffected siblings and link their early delays to future social communication, language, and motor difficulties as well as therapeutic services (OT, PT, speech) received at school-age.

Methods:

18,022 children with ASD from the SPARK study and their unaffected siblings (N=8,548) between 2-15 years of age were included (Mean (SD): 9(4.1) years., Feliciano et al., 2018). Demographic, milestone, and medical data were examined in both groups. Parents also completed measures of a) social communication delay based on Social Communication Questionnaire (SCQ), b) parent-reported measure of language delay (0=no delay, 1=some delay, 2= significant delay compared to peers), and c) risk for motor difficulties based on the Developmental Coordination Disorder Questionnaire (DCD-Q). Based on recall and memorabilia, parents provided the age in months and years for when their child first sat without support, crawled, walked, fed self with spoon, used first words, and combined words to phrases/sentences. They also reported the therapeutic services their children currently received (speech, OT, PT, etc.).

Results:

The developmental trajectories for all motor and communication milestones significantly differed between groups with greater delays in children with ASD compared to the UA group. 34.5%-55.5% of children with ASD had gross motor delays and 74.5% children with ASD had a fine motor/self-feeding delay compared to UA. 68.7%-84.7% children with ASD were delayed in using words and combining words/phrases compared to unaffected siblings. Early motor and communication delays of children with ASD were somewhat associated with their current levels of social, language, and motor difficulties (Correlation=0.1-0.2). While 82-86% children received OT and speech services only 33% received physical therapies. While speech and OT services increased with increasing early or current language/motor difficulties; this was not the case for PT services that remained low regardless of the level of motor difficulties. Additional analyses to predict a future diagnosis of ASD/non-ASD based on early delays will also be discussed.

Conclusions:

Children with ASD had more fine/gross motor and communication delays in the first 1-3 years of life compared to the UA group. Early motor and communication delays are greater in children with more severe future social, language, and motor delay/difficulties. Assessing early motor and communication delays could enhance the sensitivity of predicting ASD. While substantial Speech and OT services were provided to children with ASD, there are fewer PT/gross motor services provided. Future studies must further examine motor development in ASD beyond motor milestones to make a case for better early intervention services that include multisystem/gross motor interventions.

425.333 (Poster) Neural Correlates of the Visual Expectation of Active and Passive Touch in Autistic Adults
**Background:** Atypical sensory reactivity is an important facet of autism that can manifest as hyper and hypo-sensitivity to sensory experiences such as touch. This broad spectrum of tactile perception can lead to discomfort and harm that affects development and well-being. Tactile experiences can be further broken down into self-generated active touch and externally-generated passive touch. Behavioral evidence shows that autistic people often avoid passive touch that is out of their control but seek out self-initiated touch that is within their control. These sources of somatosensation have been shown to affect how neurotypical individuals perceive physical touch, but the differentiation between these types of physical contact remains poorly studied in ASD.

**Objectives:** This project compares the electrophysiological responses of predictable and unpredictable vibrotactile stimulation that is either actively or passively triggered. The overarching goal of this study is to provide information about how autistic individuals interact with their physical environment and quantify how the volition and predictability of the tactile sensation affects how it is experienced.

**Methods:** This project combines electroencephalography (EEG) and vibrotactile stimulation to map the cortical responses to active and passive tactile sensations in adults with autism and neurotypical controls. This project also takes advantage of recent advancements in virtual reality technology to pair virtual targets with somatosensory stimulation in a more naturalistic environment than traditional lab experiments. Here, we use electroencephalography (EEG) to measure cortical activity while virtual reality creates the visual expectation of touching an object that is paired with vibrotactile feedback. In the active condition, the participant reaches toward the virtual object and triggers tactile input. In the passive condition, the virtual object moves toward the participant and triggers tactile input. This experiment measures an electrophysiological phenomenon called the mismatch negativity (MMN), a distinct deflection in the EEG waveform shown to index a deviation from an established pattern in sensory stimuli. To elicit an MMN, we manipulate the duration of the vibrotactile stimuli, with 80% being 100 ms long and 20% being 160 ms long. The identified components of interest include the MMN, N1, and P2.

**Results:** Current data includes five (1M/4F) individuals in the neurotypical group and two (1M/1F) in the autism group and data collection is ongoing at a rate of 3-4 per week. Our early data demonstrate robust and reliable electrophysiological activity in response to all stimulus types. While these data are preliminary, they suggest larger a P2 in the autism group in the active condition as well as larger MMNs in the autism group in the active and passive conditions.

**Conclusions:** Our experiment exhibits strong potential to discriminate whether there are electrophysiological differences in how adults with and without autism process anticipated and unanticipated active and passive tactile experiences.

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**Background:** Chromatin Modifying Disorders (CMD) are caused by mutations affecting proteins responsible for chromatin remodeling and have emerged as one of the most rapidly expanding genetic disorders associated with Autism Spectrum Disorders, ASD (Lasalle, 2013; de Rubeis et al., 2014). Motor impairments are also prevalent in CMD and may play a role in the neurodevelopmental phenotype. Additionally, evidence indicates that neurological dysfunction may be treatable postnatally in CMD, thus deep phenotyping to identify clinical trial treatment targets is crucial (Fahrner & Bjornsson, 2019). We conducted motor and neurological phenotyping of two CMDs, ASXL1 and ASXL3, given their unique motor profiles and penetrance with ASD.

**Objectives:** To phenotype the motor and neurodevelopmental profile of ASXL1 and ASXL3. To examine the association of motor impairments and autism diagnosis.

**Methods:** Extensive phenotyping was conducted on 9 individuals with ASXL1 and 9 with ASXL3. Caregivers completed a comprehensive medical background form, the Movement Assessment Battery for Children (MABC) checklist - a standardized measure of motor function examining manual dexterity, aiming, catching, and balance, and the Developmental Coordination Disorder Questionnaire (DCDQ) - a measure of functional activities. Participants underwent neurological examination and quantitative gait analysis.

**Results:** Demographic information in Table 1. 38% of both groups had an autism diagnosis. Average age of first developmental concerns was 3 months in ASXL1 and 8 months in ASXL3. 5/9 ASXL1 participants achieved locomotion, with average age of first steps at 39 months; in ASXL3, average age of first steps was 28 months.

MABC: All ASXL1 (n = 7) subjects with MABC had severe motor impairments in all motor domains as did 4 ASXL3 subjects (n = 5). One ASXL3 subject had little to no motor difficulty. 75% of ASXL1 and 17% of ASXL3 noted movement difficulty affected classroom learning.
DCDQ: 100% of ASXL1 and ASXL3 met a diagnosis of developmental coordination disorder.

Neurological examination: Most ASXL1 participants had both axial and appendicular hypo and hypertonia across the lifespan. Hypotonia was most notable in ASXL3. On gait, ASXL1 showed difficulty with ambulation without supports, eversion of feet, and lower extremity spasticity. ASXL3 subjects had a wide based, clumsy gait.

ASXL1 showed distinctive differences in all quantitative gait variables compared to individuals with ASXL3. ASXL1 had (a) slower pace characterized by smaller normalized velocity, cadence, and step length, and (b) less postural control characterized by a wider stride width (Figure 2).

Participants with ASXL3 and ASD showed more severe motor impairments compared to ASXL3 and No-ASD. This was not the case in ASXL1.

Conclusions: We found that motor impairments are prevalent and pervasive across ASXL1&3 with and without ASD, and these impairments negatively impacted engagement in school-based activities. Unique neurodevelopmental and motor findings in our data include a mixed presentation of hypo and hypertonia in ASXL1 across a lifespan, slower gait, and poorer postural control compared to ASXL3. ASXL3 exhibited hypotonia and greater variability in motor skills. This deep phenotyping can aid in appropriate clinical diagnosis, referral to interventions, and serve as meaningful surrogate endpoints in clinical trials.

425.335 (Poster) Oculomotor Randomness As a Marker for Autism and Its Severity in Children: A Large Sample Study

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Background: Movement disturbances are often associated with Autism Spectrum Disorder (ASD), including the movement of the eyes. However, oculomotor abnormalities in ASD have been typically studied in terms of the social aspects of visual exploration, analyzing gaze direction to points of social interest, or comparing gaze behavior to that of typically developing individuals. Here we analyzed the temporal randomness of saccades in free viewing, inspired by a recent measure of “randomness” applied to pointing in ASD (Torres et al. 2013).

Objectives: Investigate the temporal aspects of eye movements in a large dataset of children viewing short video clips. Develop measures that could validate the diagnosis of ASD and its severity.

Methods: We analyzed a large eye-tracking data set, n=240 children, 190 with ASD, 50 with typical development (TD), age range of 1-10, average 4.5 ± 2.0 years, obtained at the national autism research center of Israel. The children watched three short (~1.5 min) video clips with social content, repeated twice. Here, we investigated the involuntary aspects of eye movements, specifically, the “randomness” of saccade timing assessed via gamma fitting of the inter-saccadic interval distribution, excluding recordings with less than 50% of the data or poor gamma fitting.

Results: Overall, the ASD children had significantly more gaps in their data, presumably due to excessive movement. The measure of saccade time “randomness”: (1) was significantly higher in ASD compared to the TD children; (2) was positively correlated with severity (ADOS comparison score); (3) was higher in ASD for all three video clips in different degrees. The effects were highly significant and robust, discriminating between groups with an AUC of ~0.82, which could be further improved by combining several oculomotor markers.

Conclusions: Increased “randomness” of eye movements in ASD children watching video clips could be related to “neural variability” or noise, reduced executive control, reduced engagement with the movies, or difficulty dealing with visual clutter. These findings could contribute to the future development of oculomotor biomarkers as part of an integrative diagnostic tool for ASD.

425.336 (Poster) Open Video Data Sharing from and Beyond Motor Development in Neurodevelopmental Conditions

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Background: Video recording is a widely used method for documenting infant and child behaviours in research and clinical practice. Video data has rarely been shared due to ethical concerns of confidentiality, although the need of shared large-scaled datasets remains increasing.
This demand is even more imperative when data-driven computer-based approaches are involved, such as screening tools to complement clinical assessments.

Objectives: To share data while abiding by privacy protection rules, a critical question arises whether efforts at data de-identification reduce data utility? We addressed this question by showcasing the Prechtl's general movements assessment (GMA), an established and globally practised video-based diagnostic tool in early infancy for detecting neurological deficits, such as cerebral palsy – and also discussed in terms of its predictive value in neurodevelopmental disorders including autism spectrum disorder (ASD).

Methods: To date, no shared expert-annotated large data repositories for infant movement analyses exist. Such datasets would massively benefit training and recalibration of human assessors and the development of computer-based approaches. In the current study, sequences from a prospective longitudinal infant cohort with a total of 19451 available general movements video snippets were randomly selected for human clinical reasoning and computer-based analysis.

Results: We demonstrated for the first time that pseudonymisation by face-blurring video recordings is a viable approach. The video redaction did not affect classification accuracy for either human assessors or computer vision methods, suggesting an adequate and easy-to-apply solution for sharing movement video data.

Conclusions:

These findings and the predictive value of GMA for ASD will be critically discussed. We call for further explorations into efficient and privacy rule-conforming approaches for deidentifying video data in scientific and clinical fields beyond movement assessments. These approaches shall enable sharing and merging stand-alone video datasets (e.g. of prodromal data in neurodevelopmental disorders) into large data pools to advance science and public health. Abstract and article @ https://arxiv.org/abs/2207.11020

425.337 (Poster) Parasympathetic Influences on the Relation between Sensory Reactivity and Restricted and Repetitive Behaviors in Non-Autistic Children

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Background:

Sensory reactivity is prevalent in autism (Ben-Sasson et al., 2009) and in the general population (Jussila et al., 2020), and it is usually discussed in three patterns: hypo-reactivity, hyper-reactivity, and sensory seeking (Baranek et al., 2006). These patterns have been found to be associated with restricted and repetitive behaviors (RRB) in autistic and non-autistic children (e.g., Feldman et al., 2020). Because RRB are thought to play a self-regulatory role during sensory experiences (e.g., Kapp et al., 2019), studies have begun to examine the autonomic nervous system (ANS) as a potential underlying mechanism. A key branch of the ANS is the parasympathetic nervous system, which is most active during rest. Recent studies have shown that reduced parasympathetic activity was associated with increased sensory reactivity (Daluwatte et al., 2015) and more RRB in autistic children (Condy et al., 2017). However, it remains unclear how parasympathetic activity might influence the relationship between sensory reactivity and RRB, and how this mechanism might look in the broader population.

Objectives:

The current study will examine whether parasympathetic activity interacts with sensory reactivity patterns in predicting RRB.

Methods:

The sample included 62 2- to 12-year-old non-autistic children (M_age=6.56 years, SD=2.73). During a 5-minute baseline period, children’s heart rate signals and respiration were recorded using a Biopac BioNomadix wireless system. Respiratory sinus arrhythmia (RSA), which refers to the variation in timing between heartbeats in the frequency of respiration, was then calculated as a marker of parasympathetic activity. Caregivers also filled out the Repetitive Behavior Scale-Revised (RBS-R; Bodfish et al., 1999) to assess RRB and the Sensory Experiences Questionnaire (SEQ; Baranek et al., 2006) to measure sensory reactivity patterns. Five RBS-R subscale scores (sensory-motor, restricted interests, self-injurious, compulsive, ritualistic/sameness; Bishop et al., 2013) and three SEQ sensory reactivity pattern scores (hypo-reactivity, hyper-reactivity, sensory seeking; Boyd et al., 2010) were calculated.

Results:

A set of hierarchical multiple regression models examined the contribution of each sensory reactivity pattern and RSA, as well as the interaction between them, in predicting each of the five RRB subtypes (see Table 1). Significant interactions were found between hypo-
reactivity and RSA in predicting sensory-motor behaviors ($B=.23$, $p=.044$), between sensory seeking and RSA in predicting self-injurious behaviors ($B=-.55$, $p<.001$), and between hyper-reactivity and RSA in predicting ritualistic/sameness behaviors ($B=-.30$, $p=.040$). Additionally, when predicting compulsive behaviors, the interactions between hypo-reactivity and RSA ($B=-.24$, $p=.047$) and hyper-reactivity and RSA ($B=.28$, $p=.046$) were significant.

Conclusions:

The current study found that the relationships between sensory reactivity patterns and sensory-motor, self-injurious, compulsive, and ritualistic/sameness behaviors change as a function of RSA levels. These preliminary results show that dysregulated parasympathetic activity at baseline might influence the relationship between sensory reactivity and restricted and repetitive behaviors in non-autistic children. The current study begins to uncover the complexity of physiological processes underlying sensory experiences and behaviors. Future work will examine the effect of sympathetic activity, as well as the interaction of both branches of ANS activity on the relationship between sensory reactivity and RRB, and will examine these questions in autistic children.

425.338 (Poster) Parents’, Professionals’, and Autistic Adults’ Perspectives on the Context and Emotions Surrounding Repetitive Behaviors in School-Aged Autistic Children

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Background:

Some studies suggested that repetitive behaviors (RBs) would be problematic, disruptive, dangerous and serve minimal functional purpose (Lin & Koegel, 2018; Ventola et al., 2016; Jaffey & Aschwin, 2022). Other studies argued that RBs, in addition to participate in autistic learning strategies, may have a self-regulating and adaptive outcome, such as a way to cope with anxiety (Collis et al., 2022; Kapp et al., 2019), to express emotions or as a form of play and a stimulating approach (Conn et al., 2015; Jaffey & Aschwin, 2022). These studies propose a new way of documenting the onset of RBs based on the perspective of autistic adults, parents, or teachers. It would be interesting to compare the content reported by different observers using a global method over the developmental period.

Objectives:

To document contexts and emotional circumstances surrounding occurrence of repetitive behaviors in school-aged autistic children based on parents’, autistic adults’, and professionals’ perspectives, as well as to compare the content reported by the different observers.

Methods:

The online French version of the Questionnaire on Repetitive Behaviors and Interests in School-Aged Autistic Children was completed via LimeSurvey by 107 autistic adults in a retrospective manner (27 men, 67 women, and 13 non-binary), by 76 parents of autistic children aged between 6.1 and 12.9 years old (63 boys and 13 girls), and 24 professionals (i.e. teachers, specialized educators, psychoeducators, speech therapists, psychologists, and social workers). Participants were asked to describe the contexts and emotions eliciting RBs. Thematic content analysis was conducted to identify contexts and emotional circumstances surrounding occurrence of RBs. Inter-coder reliability of 87% was obtained on 20% of the randomly selected verbatim. Triangulation of the data was performed to contrast the perspectives of each group.

Results:

Two types of contexts were identified by the three groups as likely to elicit RBs: social interactions and/or events (autistic adults: 38% of respondents; professionals: 31%; parents: 10%) and emotional contexts (autistic adults: 39%; professionals: 54%; parents: 31%). Also, professionals and autistic adults identified sensory overstimulation as being an important trigger of RBs (46% and 19% respectively) and parents reported changes in routine as another prevalent context triggering RBs (33%).

Anxiety/stress was the most identified emotion eliciting RBs in the three groups (autistic adults: 50%; professionals: 43%; parents: 44%). Two groups identified joy and happiness as being another important trigger of RBs, namely professionals (52%) and autistic adults (37%). Parents rather identified anger, frustration, or impatience as a frequent trigger of RBs (37%).

Conclusions:
According to all groups, RBs are triggered by specific contexts and are largely associated with emotions in autistic children. Studying the context in which RBs occur is instrumental to understand the function of these behaviors. These results also highlight the importance and richness of considering multiple respondents as different context and emotions were identified by the different groups, including autistic persons themselves, to obtain a broader understanding of RBs occurrence in autistic children.

**425.339** *(Poster)* Passion and Needs Satisfaction in Young Autistic Adults: Links with Optimal Functioning

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Background: Autistic individuals are known to have intense passions. The Dualistic model of passion (Vallerand, 2015) posits the existence of two types of passion: harmonious and obsessive. Harmonious passion (HP) has a positive impact on optimal functioning (i.e., well-being, physical health, relationship quality, performance, and contribution to society). Conversely, obsessive passion (OP) typically leads to negative effects on optimal functioning. As such, understanding how to nurture a positive and HP is key to optimal functioning. In non-autistic samples, the development and maintenance of HP is thought to depend on different factors, such as psychological needs satisfaction.

Objectives: The first aim was to investigate associations between HP, OP, needs satisfaction and optimal functioning and autistic quality of life (ASQoL). It was expected that needs satisfaction would be positively associated with HP, and negatively with OP, and that passion would be associated with optimal functioning and ASQoL.

Methods: Participants were recruited on social media through different autism associations. A total of 31 autistic individuals (24 women; M=25.68 years; SD=5.23) took part in an online study. Thinking of their favorite interest, participants completed questionnaires on passion, needs satisfaction in life, optimal functioning, and ASQoL. A path analysis with three needs satisfaction (autonomy, competence, relatedness) as an exogenous independent variables, HP and OP as endogenous independent variables and optimal functioning and ASQoL as dependent variables was performed.

Results: Participants showed high levels of HP (M=5.62/7; SD=0.91) and moderate levels of OP (M=3.28/7; SD=1.39). They spent on average 21.40 hours/week (SD=12.69) on their interest and had been practicing it for approximately 13.5 years (SD=8.89). The path analysis revealed that autonomy satisfaction positively predicted HP (β = .483; p = .007), whereas competence and relatedness were not significantly associated with HP (β = -.261; p = .148; β = .212; p = .104). Additionally, competence satisfaction negatively predicted OP (β = -.664; p = .001). Autonomy and relatedness were not significantly associated with OP (β = .082; p = .665; β = -.030; p = .857). In turn, HP predicted ASQoL (β = .503; p = .008) but was only tangentially related to optimal functioning (β = .178; p = .104). Conversely, OP negatively predicted optimal functioning (β = -.689; p < .001) but was unrelated to ASQoL (β = -.233; p = .201).

Conclusions: HP was associated with having greater psychological needs satisfaction in life, whereas OP was associated with having these psychological needs less fulfilled. Results are consistent with the hypothesis that OP might be a compensatory mechanism when psychological needs such as competence are unmet. Thus, OP might be fulfilling these unmet needs, in some cases leading to behavioral addiction (Holding et al., 2021; Lalande et al., 2017). As expected, the presence of passion was associated with optimal functioning and ASQoL in a sample of autistic young adults. HP was found to positively predict ASQoL whereas OP negatively predicted optimal functioning. Optimal functioning and ASQoL might be measuring complementary aspects of well-being and quality of life for autistic people.

**425.340** *(Poster)* Prevalence of Early Interest in and Precocious Ability with Written Material in Autism in a Representative Population

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Background: Although the scientific community has not come to an agreement on the definition of hyperlexia, it is commonly described as an intense and precocious interest in written material and a discrepancy between advanced decoding and weaker comprehension when reading. Hyperlexia is the most frequent special ability in autism (up to 20% in the literature). However, there are no recent studies assessing the prevalence of hyperlexic features in a large population of autistic children. Our study focuses on the most precocious and specific sign of hyperlexia, early interest in written material.

Objectives:
We documented the prevalence of this interest and the history of its emergence in a large representative population referred for an autism diagnostic assessment and compared the results between autistic and non-autistic individuals. A secondary objective was to collect information on other manifestations of hyperlexia and the development of oral language.

Methods:

The participants were all the children up to 6 years old who were assessed at our autism assessment clinic between 2018 and 2021, whatever their outcome diagnosis, and a neurotypical control group. They constituted a representative population from a defined geographic area in northern Montreal. The families were enrolled in two complimentary projects: (1) The medical files of all the participants (N=698, 393 autistic, 305 negative diagnosis; M\text{age}=52.12 months, SD=13.54, range=18-83) were examined using a rating grid investigating the child’s interest in letters and numbers, and (2) the families who consented to be contacted (N=255, 116 autistic, 81 negative diagnosis, 58 neurotypical; M\text{age}=53.34 months, SD=14.17, range=24-83) answered a 45-minute phone questionnaire shortly after the assessment. The questionnaire was developed based on a literature review, a previous pilot questionnaire, and experts’ opinions. It included questions about the child’s interest in letters and numbers, related behaviours and skills, oral language level, parental attitude regarding written material, and relevant qualitative information. This double approach allowed us to gather information on the entire population to ensure the representativity of our sample while obtaining more detailed information on a sub-sample.

Results:

Both studies yielded similar results: the autistic group showed a superior level of interest than both the negative diagnosis and the neurotypical groups. Significantly more autistic children had an intense or exclusive interest in written material (39.7% vs. 23.5% of the negative diagnosis and 29.8% of the neurotypical group, $\chi^2=6.02, p<0.05$). Only in the autistic group, the higher the interest, the earlier was its onset. Although most autistics did not communicate verbally, a large portion could name letters and numbers in two languages or more. Of the 30 autistic children described as completely nonverbal, 6 sang the alphabet, 7 named letters, and 2 read words. The children’s interest in numbers was investigated in the same way with similar results.

Conclusions:

These results highlight the large proportion of autistic children with a strong interest in written material at the age of diagnosis, which could be the first sign of hyperlexia. This confirms the need for more research on hyperlexia and the factors involved in its emergence.


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Background:

The majority of autistic children have sensory processing difficulties, which can impact on participation in daily life, education and leisure activities. One therapy that may be helpful is Sensory Integration Therapy (SIT), however there is currently insufficient evidence on its effectiveness. SenITA was a UK randomised controlled trial of sensory integration therapy (SIT) plus usual care versus usual care alone for children with autism and sensory processing difficulties.

Objectives:

Embedded within the trial was a process evaluation in accordance with MRC guidance to examine: i) recruitment of participants and therapists; ii) Retention; iii) Fidelity; iv) Acceptability; v) adherence; vi) adverse effects; vii) contamination.

Methods:

The process evaluation employed a mixed methods approach. Quantitative methods were used to assess recruitment rates/patterns, attendance and intervention fidelity. Qualitative interviews were used to examine experiences of the trial recruitment process, acceptability of trial processes and measures, intervention implementation and acceptability, and the role of contextual factors.

Results:

258 carers contacted the study team to express an interest in taking part. Screening appointments were held with 150 carers and children from which 138 children were randomised into the trial (92% of those screened, 53.5% of those who expressed an interest in taking part). Participants were likely representative of the wider population of children in primary education with a diagnosis of autism presenting to services. The majority were male (79%) and white British (88%)
107 participants (77.5%) provided follow-up data at the primary outcome timepoint (6 months) and 69.6% at the 12-month follow-up. SIT delivered met fidelity with 10 out of 12 therapists scoring an average of at least 80/100 on the process fidelity measure for at least 80% of each of their sessions.

Semi-structured interviews were conducted with 30 carers of children and 13 therapists involved in intervention delivery. Transcripts were analysed thematically using a framework approach. Changes in children following the SIT were perceived to have a positive impact on family life. Parents also reported that the therapy helped them develop a better understanding of their child. Observed changes were not always sustained, and some therapists did not believe that SIT was the most appropriate approach for all children, and outcomes were dependent on parental engagement. Overall, 54 participants allocated to the SIT arm received at least 13 SIT sessions during the intensive stage (78.3%). The median number of SIT sessions received was 20 (IQR: 16 to 21).

There were no serious adverse events (SAE). Most carers reported that there had been no changes to the support their child received during the trial period.

Conclusions:

The process evaluation demonstrated that recruitment of participants and therapists and delivery of intervention all met required thresholds. Retention was good and carers generally found trial processes acceptable. Adherence to the intervention was high with no serious adverse events reported. There was minimal contamination in the usual care arm, and families allocated to SIT did not report receipt of any other significant intervention or contact with services.

425.342 (Poster) Relationships between Sensory Reactivity and Aberrant Behavior in Autism and Two Neurogenetic Syndromes: Phelan-McDermid Syndrome and Adnp Syndrome

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Background: Phelan-McDermid syndrome (PMS) and activity-dependent neuroprotective protein (ADNP) syndrome are neurogenetic syndromes associated with autism spectrum disorder (ASD) and intellectual disability (ID). Recent literature describes high levels of sensory hyporeactivity in PMS (Tavassoli et al., 2021) and seeking in ADNP syndrome (Siper et al., 2021). Studies in autism more broadly describe the impact of sensory reactivity on internalizing and externalizing symptoms (Rossow et al., 2020). Understanding these relationships is important in the context of clinical trials in both syndromes.

Objectives: To examine the relationship between sensory reactivity and aberrant behavior in PMS, ADNP, and idiopathic ASD (iASD).

Methods: Participants included 36 individuals with PMS (Mage = 7.34), 19 with ADNP syndrome (Mage = 6.87), 28 with iASD and ID (Mage = 6.32), and 18 without ID (Mage = 6.56). The Sensory Assessment for Neurodevelopmental Disorders (SAND), a clinician-administered observation and caregiver interview, measured sensory hyporeactivity, hyporeactivity, and seeking. The Aberrant Behavior Checklist (ABC) measured irritability, social withdrawal, stereotypy, hyperactivity, and inappropriate speech. Bivariate correlational analyses were explored.

Results: Overall sensory reactivity significantly correlated with social withdrawal in PMS, ADNP, and iASD with ID (r's = .39-.60, p's < .037), and with stereotypy in PMS (r = .46, p = .004) and ADNP (r = .64, p = .003). Overall sensory symptoms were also moderately correlated with irritability in ADNP (r = .59, p = .008) and iASD with (r = .51, p = .005) and without (r = .482, p = .043) ID. Hyporeactivity correlated with social withdrawal in PMS (r = .54, p = .001) and ADNP (r = .54, p = .016), but not iASD. Hyporeactivity also correlated with stereotypy in PMS (r = .55, p = .001), and hyperactivity in ADNP (r = .71, p = .001). Individuals with PMS and ASD (n = 29) drove relationships between hyporeactivity and social withdrawal (r = .50, p = .006) and stereotypy (r = .47, p = .010). However, the relationship between hyporeactivity and hyperactivity in ADNP remained strong for those with (n = 9, r = .84, p = .005) and without ASD (n = 10, r = .69, p = .029). Hyperreactivity strongly correlated with social withdrawal (r = .69, p = .026) in ADNP and irritability in iASD without ID (r = .63, p = .005). Finally, sensory seeking strongly correlated with irritability (r = .69, p = .001) in ADNP (r = .69, p = .001) and iASD without ID (r = .63, p = .005).

Conclusions: Relationships between sensory reactivity and aberrant behavior were identified, with notable differences based on diagnostic group and the presence of ASD or ID within them. Overall sensory symptoms were most consistently related to social withdrawal in groups with ID. The presence of ASD impacted findings in PMS, but not ADNP syndrome. While further investigation of these relationships is needed, significant correlations across domains of sensory reactivity and aberrant behavior suggest interventions targeting sensory symptoms may be a critical avenue to explore with probable downstream effects on aberrant behavior.
Background: Autism Spectrum Disorder (ASD) encompasses a broad range of behavioral and functional deficiencies, often displaying wide divergence in presentation. Repeated attempts have been made to understand if there is any common underlying causality that can explain this wide presentation. It has been hypothesized that ASD could be a result of disorder in prediction capabilities in human brain. However, it’s unclear as to what extent both spatial and temporal predictive abilities are impaired.

Objectives: To determine if prediction abilities in temporal and spatial domains, and their combination which is of relevance in a dynamic real-world environment, are impaired in ASD children. This study specifically focusses in age ranges of 8 – 12 years, using Machine-Learning based interactive video games that provide a customized challenge as per the response of the child depending on the severity of the symptoms in the spectrum.

Methods: Participants were 16 ASD and 16 age-matched Neurotypical (NT) controls in the age range of 8-12 years. All were healthy individuals with CARS score in mild-moderate ASD range. Reinforcement-Learning based interactive video games were developed that measure and analyze the responses of the player to determine their prediction abilities. These games analyzed both the temporal and spatial predictions.

For example, how long(temporal estimations involved) they need to estimate a certain distance (spatial estimation involved) presented to them in a dynamic environment with an avatar, as well the accuracy of the estimation computed via various metrics. The distance of the computed barrier is dynamically updated using ML-techniques based on prior responses. They were presented to the participants on Android-based Lenovo Tab with 8” screens for clear visibility and had sound effects to increase immersion.

There was a 20-minute priming exercise to get comfortable and understand the game. During this priming exercise, their parents and a team of psychologists additionally supported them. Following the familiarization process, they were comfortably seated in a distraction-free room and played the games. Their performance was recorded on remote high compute Amazon Web Servers. The Individual Prediction maps (based on Gaussian and Bayesian analysis) were precomputed for better performance. Based on the subject’s response, the next task was dynamically presented through the Reinforcement Learning frame work to improve their prediction abilities.

Results: We observed that prediction accuracy in the static ambience seemed to be comparable with neuro typical subjects under certain condition, while differing in other conditions. We also noted correlations between various other parameters such as motor skills, eye contact and prediction abilities. However, we noted significant deficiencies in the dynamic ambience, i.e. when the game environment was altered in a sensory-affective manner. Also, failure patterns were significantly detected in ASD subjects, which was not observed in the case of NT subjects.

Conclusions: In this study, we intend to present these novel findings that prediction accuracy in the static ambience seemed to be comparable with neuro typical subjects under certain conditions and also there is correlation between various parameters. Also, studying these patterns in more detail and characterizing them is a topic of further studies.
Methods: We analyzed relationships between three tasks with different stimulus modalities and time scales: 1) a Method of Constant Stimuli (MCS) task to test perceived synchrony of individual heartbeats and visual stimuli as a function of temporal offset, yielding a temporal binding window (Brener and Ring, 2016); 2) Legrand et al.’s (2022) heart rate discrimination (HRD) task to test discrimination of heart versus auditory rate changes (not requiring perception of individual beats), yielding estimated heart rate precision; and 3) Walsh et al.’s (2019) respiration integration task (RIT) to test whether breathing synchronized with a moving visual stimulus improves subsequent visual speed discrimination relative to an exteroceptive-only baseline, yielding a threshold difference score. Participants included n = 23 non-autistic (NT, 22% male) and n = 14 autistic (AUT, 64% male) individuals ages 8-52 years, though most were adults (75%). Relationships between task variables were assessed with Pearson correlation.

Results: In both groups, wider temporal binding windows between heartbeats and visual stimuli (as assessed by MCS) were highly correlated with less precise heart rate discrimination assessed by HRD, though this was especially prominent in the autistic group (AUT: R-squared = 0.62, NT: R-squared = 0.06). Improvements in detecting visual speed changes with synchronized breathing (as assessed by RIT) were not significantly correlated with either cardiac task. Preliminary relationships with age suggest that integration precision increased with age for both the HRD and RIT tasks (but not the MCS), though these relationships were stronger in the non-autistic group (HRD: R-squared = 0.25 and RIT: R-squared = 0.21) than the autistic group (HRD: R-squared = 0.16 and RIT: R-squared = 0.03).

Conclusions: Our results suggest that these tasks may indeed index some shared and some distinct aspects of IE integration; for example, single heartbeat integration may impact the ability to contextualize heart rate changes related to threat. However, individual differences in IE integration may vary substantially by interoceptive stimulus (cardiac versus respiration). Further, these findings point to potential group differences in how integration develops with age, though confirmation of these preliminary patterns is needed. Future work in larger samples will study relationships between these measures, diagnostic group status, and physical/emotional health outcomes.

436.289 (Poster) Quantitative Assessment of Tip Toe Behavior in Individuals with Autism Spectrum Disorders Using a Structured Methodology: Comparison between Video-Recording and Wearable Sensors Approaches. G. Valagussa1, L. E. Moltchen2, M. Boccotti3, G. Andreoni1 and E. Grossi1, (1)Autism Research Unit, Villa Santa Maria Foundation, Tavernerio, Italy, (2)Program in Physical Therapy, School of Medicine and Surgery, University of Milano Bicocca, Monza, Italy, (3)Department of Design, Politecnico di Milano, Milan, Italy, (4)Bioengineering Laboratory, Scientific Institute IRCCS “E.Medea”, Bosisio Parini, Italy, (5)Autism Research Unit, Villa Santa Maria SCS, Tavernerio, Italy

Background: Tip-toe behavior (TTB) is showed by about 20% of individuals with ASD and is poorly quantified with structured methods. In a previous study, we proposed a standardized method to quantify TTB during static and dynamic tasks using a video-recording approach in an ecological setting. This testing approach is very time-consuming and operator dependent requiring an operator to review the videos and computing the parameters. To overcome these limitations, an instrumental approach using wearable sensors (WS) and an automated calculation system was developed and applied. Moreover, WS approach would also permit monitoring gait for a longer time during the day.

Objectives: This study aims at implementing a WS-based protocol for the quantitative assessment of TTB and its validation by the comparison with the reference video-recording approach.

Methods: Individuals with ASD diagnosed according to DSM-5 criteria and a diagnosis confirmation using the Autism Diagnostic Observation Schedule (ADOS) were involved in the study. TTB was quantified during structured static and dynamic tasks using a video-recording approach, previously described. All the tests were performed without shoes albeit with “Sensoria® Smart Socks”. The dynamic test consists in transporting 1 object (e.g. puzzle piece, Lego®) from the therapist to the playing table situated 2 meters away and back again 15 times. The static test consists in playing while standing in front of a table for 3 minutes. Both assessments were repeated on three different days for each individual (9 assessments). “Sensoria® Smart Socks” (SSS) are the validated WS used during the video-recorded tests. In this way, we were able to collect data obtained from video-recording and WS approaches at the same time. The result of the video-recording and WS approaches were analyzed. The intraclass correlation coefficient (ICC) was used to assess the reliability between the video-recording and WS approaches in quantifying the mean percentage of toe steps and the mean percentage of the time spent in TTB.

Results: We assessed 3 individuals with ASD and TTB. The age was 10.9yrs, 12.8yrs and 13yrs (3/3 males) and their ADOS calibrated severity score was 9, 10 and 8, respectively. The normal distribution of data was confirmed (Shapiro-Wilk test p > 0.05). The ICC values of the mean percentage of toe steps and the mean percentage of the time spent in TTB were 0.778 (excellent) and 0.731 (good), respectively.

Conclusions: The “Sensoria® Smart Socks” used for the quantitative assessment of TTB in individuals with ASD showed good-to-excellent reliability in comparison with the reference video-recording approach both during a static and dynamic tests. Further research is required to confirm the results of this preliminary study.
Background: Although speech impairment is highly prevalent in autism spectrum disorder (ASD), the neurophysiological barriers to speech remain poorly understood.

Objectives: This study measured the response to simulated speech errors via real-time alterations in auditory feedback of one’s speech in order to examine the use of feedforward control of speech production in participants with and without ASD.

Methods: Participants were 73 children and adolescents ages 8-17 years who were diagnosed with ASD (N=46) or were typically developing control (TDC) participants (N=28). Participants underwent diagnostic and neuropsychological testing and were administered an altered speech feedback task. For this task participants spoke the word “bed” upon cue into a headset microphone and heard their speech through headphones via a digital signal processing system. The inter-trial-interval between cues was 2.5 seconds. For the first and last 20 trials the auditory feedback of speech produced into the microphone was unaltered. For trials 21-70 the formants F1 and F2 were shifted in real time by the digital signal processing system. F1 was raised 200Hz and F2 was reduced by 250Hz to make the vowel sound /æ/ sound closer to /eh/, simulating a speech error. The compensatory vocal adjustment in response to this shift (sensorimotor adaptation) was quantified to compute adaptation according to the following procedures. The applied formant shift and produced formants were represented as vectors from baseline formant values in an F1-F2 (first and second formants) Euclidean space. Produced formant frequencies were extracted from spectrograms of entire vowel utterances. Trials with formant drops and incorrect tracking were excluded from. The scalar projection of the produced formants vector on the formant shift vector was determined. Percentage adaptation was calculated as $-100 \times (1 - \text{scalar projection})$/binomial magnitude of applied shift for each trial. The mean percent adaptation of all altered feedback trials was calculated for each participant, compared between groups, and examined in relation to oral motor speed (diadochokinetic rate for “puh-tuh-kuh”).

Conclusions: Speaking rapidly allows less time for online processing and utilization of auditory feedback of one’s own speech. Thus, ability to produce rapid speech can indicate successful use of feedforward control mechanisms. The reduced speech adaptation identified in the ASD group suggests that individuals with ASD may struggle with learning in the feedforward system. The association between reduced adaptation (indicative of poor feedforward learning) and slower diadochokinetic rate may suggest that some individuals with ASD need to rely more on feedback control mechanisms (which only work at slow speech rates) for speech production to compensate for an inability to rely on feedforward control.

436.291 (Poster) Reduced Thalamic Inhibition Relates to Neural Mechanisms of Sensory over-Responsivity in ASD Youth


Background: Sensory processing atypicalities are present in over 90% of autistic youth (Leekam et al., 2007), and excitation/inhibition imbalance has been theorized to contribute to sensory issues in autism spectrum disorder (ASD). Reduced GABA levels in the thalamus (i.e., sensory relay station) have recently been linked to sensory over-responsivity (SOR) in autism (Wood et al., 2021), suggesting dysfunctional thalamic gating of sensory signals to downstream sensory regions in ASD. Previous research has shown that SOR is associated with heightened activation in sensory cortical regions (Green et al., 2013, 2015); however, whether there is a link between thalamic GABA levels and cortical sensory over-responsivity remains unclear.

Objectives: To assess whether thalamic GABA modulates sensory-evoked neural activation differently in ASD and typically developing (TD) youth.

Methods: In a sample of 13 ASD and 16 TD participants (aged 8.6-17.7 years), we collected functional magnetic resonance imaging (fMRI) data during mildly aversive tactile and auditory stimulation. In addition, single-voxel edited 1H-MR spectra from the thalamus were collected with a MEGA-PRESS pulse sequence on a 3T Siemens scanner and analyzed using the Gannet pipeline. GABA+/creatinine ratios ([GABA]) were entered as a bottom-up regressor in within- and between-group analyses predicting neural responses to sensory stimulation. Results were cluster corrected for multiple comparisons at $p<0.05$ and thresholded at $z>2.3.$
Results: In TD, lower levels of thalamic [GABA] were associated with stronger activation in ventromedial and dorsomedial prefrontal cortex (Figure 1). In ASD, lower thalamic [GABA] was related to stronger activation in visual, auditory, and somatosensory cortical regions as well as frontal cortex and cerebellum. Thalamic [GABA] was more strongly negatively related to neural sensory responses in the same sensory and frontal regions in ASD compared to TD.

Conclusions: Reduced thalamic inhibition is associated with sensory cortical overactivation in ASD. These findings indicate that reduced filtering of sensory information at the level of the thalamus may underlie the previously reported relationship between SOR and heightened neural activation, providing a link between neurochemistry of the thalamus, atypical sensory-evoked neural responses, and sensory processing issues in autism. Future research in animal models will be instrumental in investigating a causal link between thalamic inhibition and SOR.

**436.292 (Poster) Relating Altered Auditory Habituation to Sensory Reactivity in Autism Spectrum Disorder**

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Background: Sensory hyper- and hyposensitivity are characteristic of autism spectrum disorder (ASD) and can paradoxically co-occur in the same individuals. Changes in stimulus response over time (i.e., in response to repeated stimuli) could contribute to this sensory processing paradox. Indeed, prior studies in school age children and adolescents have found reduced auditory habituation in individuals with ASD compared to typically developing (TD) individuals. However, few studies have examined auditory habituation in preschool children or the relationship between auditory habituation and paradoxical hyper- and hyposensitivity. Measuring cortical responses to repeated sensory stimulation in preschoolers with ASD provides an opportunity to objectively and quantitatively evaluate sensory processing and establish the interaction between paradoxical sensory reactivity at a global level.

Objectives: To evaluate whether auditory habituation measured via EEG 1) differs in preschoolers diagnosed with ASD compared to age matched TD children and 2) correlates with sensory features of ASD, namely hyperreactivity and hyporeactivity composite scores derived from the Sensory Profile 2 (SP2).

Methods: Multichannel EEG data were collected from 3-4 year old children with ASD (n = 14, 85% male) and TD (n = 13, 69% male) during an auditory temporal habituation paradigm consisting of 5 repeating tones per trial. Global Field Power (GFP) was computed for 156-204 ms post tone onset, consistent with prior studies. For each participant, auditory habituation was operationalized as the slope of GFP values across tones 1-5. For a subset of this sample (nASD = 14, nTD = 11), caretakers completed the SP2. To measure sensory reactivity using the SP2, hyporeactivity was defined as the sum of the Registration and Seeking quadrants while hyperreactivity was defined as the sum of the Sensitivity and Avoiding quadrants. An independent t-test examined whether auditory habituation differed between diagnostic groups. Finally, for those with SP2 data, we conducted Pearson correlations to examine whether habituation significantly related to domains of sensory processing, namely hyporeactivity and hyperreactivity.

Results: Auditory habituation was significantly reduced in ASD compared to TD participants (p = .03). On average, participants with ASD had increasing GFP (i.e., facilitation) over the 5 tones, while TD participants had decreasing GFP (i.e., habituation). Within ASD participants, habituation significantly positively correlated with hyporeactivity (r = 0.56, p = .03) and had a trending positive correlation with hyperreactivity (r = 0.50, p = .06).

Conclusions: Our study is among the first to examine auditory habituation in young children. We found reduced auditory habituation in preschoolers with ASD compared to TD peers, replicating previous findings in older cohorts. Specifically, while TD participants habituated across repeated tones, ASD participants exhibited a facilitation response. ASD participants who habituated less to auditory tones tended to have higher SP2-derived hyporeactivity composites. This hyporeactivity-habituation correlation, coupled with trending significance in the hyperreactivity-habituation correlation, lend preliminary support for habituation as an account for the co-occurrence of hypo and hypersensitivity in ASD (i.e., hyposensitivity to initial stimuli followed by hypersensitivity to repeated stimuli). This study is actively recruiting and will be conducted with larger samples to continue exploring auditory habituation in ASD and young children.

**436.293 (Poster) Restrictive and Repetitive Behaviors in Children with and without Autism Spectrum Disorder: Associations with Amygdala Subnuclei and Anxiety**

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Background: The presence of restrictive or repetitive behaviors (RRBs) are required for a diagnosis of Autism Spectrum Disorder. These behaviors can include resistance to changes in routine or play, and repetitive motor patterns. Although prevalent in ASD, RRBs occur in other disorders, as well as in the typically-developing population. It has been proposed that RRBs may serve to alleviate anxiety, which is heightened in ASD compared to non-ASD individuals. The amygdala is associated with both anxiety and ASD symptomatology.
Objectives: Our main aim was to determine whether there was an association between parent-reported anxiety and amygdala subnuclei volumes in predicting RRB scores, and whether these associations differed between children with and without ASD.

Methods: All data was collected by the Healthy Brain Project. Data from 66 children were included in all analyses, 30 with an ASD diagnosis (24M, mean age 8 yrs) and 36 without an ASD diagnosis (12M, mean age 7.86 yrs). All children were 5-10 years of age. Parents completed the Repetitive Behavior Scale, as well as the Screen for Child Anxiety Related Disorders (SCARED-P). Children underwent an MRI and amygdala subnuclei volumes were extracted with Free Surfer. T-tests were run to compare RBS and anxiety scores between groups. A generalized linear model (GLM) was then run with RBS scores as the dependent variable, and amygdala subnuclei volumes, anxiety, and diagnosis as the independent variables, adjusting for sex, age, and total cerebral volume (TCV) to examine the association between amygdala volumes and anxiety with RBS scores. GLM post hoc tests were run to examine significant interaction effects.

Results: Children with ASD had significantly higher RBS (p<.001) and anxiety (p=.009) scores than children without ASD. The left medial (p=.004) and right corticoamygdaloid transition area (CAT) (p=.009) volumes were significantly associated with RBS scores, as was anxiety (p<.001). Post hocs reveal that in non-ASD children, smaller left medial volumes were associated with higher RBS scores (p<.001), as association not seen in ASD children. It was also found that greater anxiety was associated with greater RBS scores in ASD children (p<.001), while the opposite relationship was seen in non-ASD children (p=.011).

Conclusions: Smaller left medial and larger right CAT nuclei and were associated with higher RBS scores. The medial nucleus is associated with social and emotional responding while the CAT region has been implicated in affective disorders. Of note, children with ASD displayed different associations between anxiety and RRBs than non-ASD children, suggesting the mechanisms underlying these behaviors may differ in ASD. Further investigations into ASD-specific phenotypes of anxiety are necessary.

436.294 (Poster) Rewarded Inhibitory Control As a Marker of Repetitive Behaviors and Their Underlying Pathophysiology in Adolescents with Autism Spectrum Disorder

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Background: Restricted and repetitive behaviors (RRBs) significantly interfere with multiple aspects of daily life and persist throughout the lifetime, but are not consistently or effectively treated due to a limited understanding of their underlying psychological and neural mechanisms. Data from our lab and others indicate that individuals with ASD show a reduced ability to inhibit contextually inappropriate behaviors (inhibitory control) that is associated with more severe clinical RRBs. Studies of typical development have shown that inhibitory control is strongly influenced by the extent to which inhibition of a response is associated with a reward, particularly during adolescence, suggesting that a reduced ability to modulate task-relevant brain networks based on reward contingencies may contribute to RRBs in ASD.

Objectives: In this study, we used a novel quantitative assessment of rewarded inhibitory control to test whether the interaction of inhibitory control and reward processes better predicts clinical RRB severity than existing unidimensional models. We also examined relationships between task performance and resting state connectivity of inhibitory control brain networks.

Methods: Eleven adolescents with ASD and 8 age-matched controls (mean age = 13.9 years) were tested using a novel rewarded antisaccade paradigm. Participants were instructed to inhibit eye movements (prosaccades) toward peripheral targets and instead look immediately to the mirror location of the target in the opposite hemifield (antisaccades). Prior to target appearance, a cue indicated whether reward could be earned for correct performance on the trial (blocks were randomized for reward or no-reward contingencies); a green checkmark was presented following correct antisaccade performance on rewarded trials. RRB severity was measured using the Flexibility Scale. Resting-state functional connectivity (rsfMRI) also was examined. Data collection is ongoing.

Results: Antisaccade accuracy was reduced in ASD relative to controls (d=.98) during no-reward trials, but similar across groups during reward trials. Improvements in accuracy during rewarded relative to non-rewarded trials (“reward gain”) were greater in ASD than controls (d= .89). RRB severity was modestly negatively correlated with non-reward antisaccade accuracy (R² = .34), but strongly negatively correlated with rewarded antisaccade accuracy (R² = .51). In participants with ASD, increased reward gain was associated with reduced striatal-ventral lateral prefrontal (vIPFC) rsfMRI connectivity.

Conclusions: We present novel data suggesting that inhibitory control and reward cumulatively contribute to RRB severity and that a multi-factor model accounting for their interaction may provide a more robust predictor of clinical RRBs. Inhibitory control and reward processes each are supported by parallel, but interactive brain circuitries involving connections between cortex and striatum that have been heavily implicated in RRB development and severity and are known targets of medications commonly prescribed to individuals with ASD (e.g., selective serotonin reuptake inhibitors; SSRIs). Our data demonstrating associations between reward gain and cortical-striatal
connectivity suggests this may constitute a key mechanism that can be used in future studies to identify predictive outcomes for therapeutics targeting RRBs in ASD.

**436.295 (Poster) Self- Versus Parent-Reported Measures of Sensory over-Responsivity: Associations with Neural Activation in Autism**

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Background: Sensory over-responsivity (SOR), a heightened negative reaction to aversive sensory stimuli, affects over half of autistic individuals. Despite its prevalence, methods for measuring SOR are still widely understudied and under debate (Cascio et al., 2016). Parent-reported data capture observed sensory related behavior and are often used in younger children who may less accurately report on their sensory experiences. Self-reported data are a more reliable measure of internalizing symptoms such as anxiety in older children, and thus may capture internal SOR experiences beyond what is observable (Baxter et al., 2016). Parent-reported SOR in autistic children is related to heightened sensory-limbic activation during aversive sensory stimulation (Green et al., 2015). However, it is unknown how such neural sensory responses might relate differently to self- versus parent-report of SOR, especially across ages. Understanding how age affects self- versus parent-report can inform decisions about optimizing SOR assessment.

Objectives: To examine the relationship between sensory brain responses and parent- versus self-reported SOR in children through young adults with autism.

Methods: Autistic individuals ages 10 to 22 (n=31, mean=15.7, SD=3.66) and their parents completed the Sensory Processing 3-Dimensions Inventory (SP3D) about their own and their child’s sensory processing, respectively. Each participant underwent a functional MRI (fMRI) scan during which they were presented with mildly aversive tactile and auditory stimuli. FMRI analyses were performed at a threshold of Z=2.3, p>.05. Parent and self-reported SOR scores were entered in two separate bottom-up regressions to examine how each independently predicted brain responses.

Results: Self- and parent-reported SOR were correlated (r=.44, p=.014, and each showed different relationships with brain activation. Lower parent-reported SOR correlated with regions involved in higher-level cognition and regulation (paracingulate, frontal pole, superior frontal gyrus, supplementary motor area; Figure 1). By contrast, lower self-reported SOR correlated with more activation of regions involved in emotion and sensory integration (supramarginal gyrus, angular gyrus, precentral gyrus, and temporal pole; Figure 2). Higher SOR did not predict higher activation in either analysis. Additional analyses with younger participants will investigate the role of age in these two SOR measures.

Conclusions: Correlations between parent- and self-reported scores indicate consistency between both measures, however, each is related to distinct brain responses suggesting they capture different aspects of SOR. The relationship between lower parent-report SOR and activation in regions involved in emotional and behavioral regulation suggests that parent-report may better capture behavioral responses to sensory input, while self-report may capture how a person feels about sensory experiences regardless of behavior. Contrary to prior research (Green et al., 2015), we did not find positive correlations between parent-reported SOR and brain responses, which could be due to the older age of this sample. It is possible that, like with other internalizing symptoms, children become better regulators with age and show fewer outward behaviors, thus accuracy of parent-reported SOR will decrease and individuals may become better reporters of their own internal sensations. The difference between younger and older participants in the relative associations of parent- and self-reported SOR with brain responses will be discussed.

**436.296 (Poster) Sensory Processing Abilities on Adaptive Behavior in Autistic Adults**

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Background:

Sensory processing is the ability to process multisensory input for appropriate action (Mueller and Tronick 2020). Previous research indicates that sensory processing difficulties can predict behavioral, communication, and social performance difficulties in autistic children (Lane et al., 2010; Hilton et al., 2007). In autistic adults, sensory processing difficulties, particularly low registration or the tendency to demonstrate a high threshold and not attend to typical sensory elements, mediates the relationship between attention and social responsiveness (Crasta et al., 2020). However, the relationship of sensory processing difficulties and adaptive behavior has not been explored in an autistic adult sample.

Objectives:

To examine the relationship between sensory processing difficulties and adaptive behaviors in autistic adults.
Methods:

Participants were recruited as part of an ongoing assessment database of autistic and non-autistic children and adults maintained by a specialty autism center in southeastern US. The current study included 28 autistic adults (17 females/11 males; M_{age}=30.96 years SD_{age}=11.09; 82% White) who completed an autism assessment consisting of a battery of clinical interviews, behavioral assessments, and questionnaires to inform an ASD diagnosis. Participants completed the Adolescent/Adult Sensory Profile (AASP; Brown and Dunn 2002) and the Adaptive Behavioral Assessment System-3 (ABAS-3; Harrison and Oakland 2015) as part of their assessment. The AASP yields total raw scores across four domains of sensory processing (low registration, sensation seeking, sensory sensitivity, and sensation avoiding), with higher scores indicating more difficulty. The ABAS-3 yields age-normed scaled scores across 10 domains of adaptive behaviors (Communication, Community Use, Functional Academics, Home Living, Health and Safety, Leisure, Self-Care, Self-Direction, Social, Work), with lower scores indicating worse functioning.

Results:

Partial correlations, controlling for gender and race, revealed significant negative relationships between the AASP Low Registration domain and the ABAS-3 subdomains: Communication, Self-Care, Self-Direction, Health and Safety, and Social skills (Table 1); between the AASP Sensory Sensitivity domain and the ABAS-3 subdomains: Communication, Self-care, and Self-Direction; and between the AASP Sensation Avoiding domain and the ABAS-3 subdomains: Communication and Social skills on the ABAS-3 (Table 1). There were no significant correlations between the AASP Sensation Seeking domain and any of the ABAS-3 subdomains.

Conclusions:

Sensory processing abilities can affect social skills, communication, attention, work and academic achievement in autistic adults. Low registration, which impacts self-regulation to sensory input (Machingura et al. 2019), appears to have particularly widespread effects on multiple domains. These findings suggest areas of consideration when developing or delivering treatment with autistic adults, such as including an evaluation of sensory processing abilities and utilizing sensory based interventions.

436.297 (Poster) Sensory Responsiveness and Activity Participation in Autistic Adolescents

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Background: Participation in daily self-care, academic, and leisure activities is essential to the growth and development of children and adolescents and continues to directly relate to a person’s health and well-being. These meaningful activities, or occupations, support development of interests and identities, well-being and quality of life (Gutman & Schindler, 2007; Hilton & Ratcliff, 2021; Potvin et al., 2012). Studies have shown that autistic children experience lower participation diversity than those without an autism diagnosis, and that these levels of participation decrease over time (Hilton et al., 2008; Potvin et al., 2012; Simpson et al., 2019). Better understanding of relationships between sensory processing and aspects of participation can increase our ability to support improved growth and development, health, and well-being in autistic individuals. Most previous studies examining the relationship between atypical sensory processing and activity participation among children with no autism diagnosis have included children younger than 13 years of age.

Objectives: To examine the relationship between sensory processing and out-of-school activity participation diversity, intensity, and enjoyment in autistic adolescents.

Methods: Forty-two autistic adolescents (male = 36) from age 12 to 18 years (mean = 16.10 years age =30.96 years) who completed an autism assessment consisting of a battery of clinical interviews, behavioral assessments, and questionnaires to inform an ASD diagnosis. Participants completed the Adolescent/Adult Sensory Profile (AASP; Brown & Dunn, 2002) and participation (Children’s Assessment of Participation and Enjoyment; CAPE; King et al., 2004) questionnaires. Relationships between sensory quadrant scores and participation diversity, intensity and enjoyment were examined.

Results: All sensory quadrants scores showed some atypical scores (30 to 35% of scores), except sensation seeking (4.8%). Sensation seeking was significantly positively related with out-of-school activity for most categories of enjoyment and for most categories of diversity and intensity. Among the sensory quadrants, sensation seeking consistently had the strongest relationships with out-of-school activity participation. It had significant relationships with overall activity diversity and intensity. For diversity activity categories, all were significantly correlated with sensation seeking except recreational and self-improvement activities. For intensity activity categories, all were significantly correlated with sensation seeking except recreational activities. For activity enjoyment categories, all were significantly correlated with sensation seeking except for recreational activities. Relationships between individual activity enjoyment and sensory quadrant scores revealed 12 items being correlated with sensation seeking.

Conclusions: Findings indicate that sensory processing patterns are related to participation in the out-of-school activities in which autistic adolescents engage for the sensation seeking sensory quadrant. Sensation seeking was generally similar to or less than most people and was related to several categories of activity participation diversity, intensity, and enjoyment and to enjoyment of various physical activities,
lessons, shopping and arts and crafts. Adolescents with limited participation should be encouraged to explore areas of interest to them involving rich sensory experiences and develop strategies that will allow them to increase their sensation seeking to support skill development, health, and well-being.

436.298 (Poster) Sex Differences in Motor Functioning of Typically Developing and Autistic Youth

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Background:

Sex differences in prevalence, diagnosis, and core symptoms of autistic individuals have recently gained increasing research attention. Another recently targeted research area is these individuals’ substantial impairment and delay in motor-related development (e.g., Zampella et al., 2021) including gross-motor skills (e.g., poor lower- and upper-limb, locomotor, and gait coordination); fine-motor skills (e.g., ineffective scissor-cutting); and joint action (JA) abilities (e.g., reduced dyadic motor coordination). Though both research areas are of rising interest, the intersectional investigation of sex differences and motor functioning is scarce in children and adolescents with autism spectrum disorder (ASD).

Objectives:

This study compared cognitive able youngsters with ASD to typically developing (TD) age-matched controls to examine individuals’ sex (boys/girls), group (ASD/TD), and motor functioning (gross/fine coordination) as contributing to dyads’ joint motor coordination (JA). First, we investigated group and sex differences in individual and dyadic motor coordination. Next, we analyzed the associations between individual and dyadic motor coordination for each sex. Then, we examined whether the relationship between sex and dyadic motor coordination via individual motor functioning is moderated by group. Understanding the role group and sex differences play in individual and dyadic motor functioning may encourage the development of gender-personalized interventions for autistic youngsters.

Methods:

Study participants included 90 children and adolescents: 46 with ASD (M=11.35yrs, IQ=94.78, 14 girls) and 44 with TD (M=10.82yrs, IQ=108.64, 16 girls). Group and sex differences on age and IQ were nonsignificant. Individual motor functioning was evaluated by the Individual Motoric Observation Scale (IMOS) based on participants’ fine-motor abilities (cutting, nailing) and gross-motor abilities: object use (dribbling, ball throw-and-catch) and locomotion (jumping, heel-to-toe walking, skipping). To evaluate dyadic motor abilities, dyads in each group were paired by sex, IQ, and chronological age. They performed a JA-walking task with their peer (side-by-side walking with legs coordinated with their partner), which was coded for frequency of co-occurring steps.

Results:

A series of GroupXSex ANOVAs yielded significant main effects on Group (ASD < TD) for object use [F(1, 86)=22.75, p=.000], locomotion [F(1, 86)=35.97, p=.000], fine-motor [F(1, 86)=13.94, p=.000], and JA-walking task [F(1, 86)=13.00, p=.001]. Main effect on Sex (boys < girls) emerged only for gross-motor locomotion [F(1, 86)=14.87, p=.000]. Also, significant GroupXSex interactions emerged for locomotion (TD-boys > ASD-boys; ASD-girls > ASD-boys) and for JA (see Figure 1). Significant positive correlations emerged between fine-motor and JA in girls (r=.31, p=.047) and between gross-motor and JA in boys (r=objects=.37, p=.002; rlocomotion=.33, p=.005), beyond group. The moderated mediation analysis indicated a significant sex effect on locomotion with group moderation in boys only; thus, ASD-boys' poor and TD-boys' elevated locomotion ability predicted a better JA-Walking coordination (see Figure 2).

Conclusions:

Boys with ASD are the most vulnerable subgroup in terms of their individual and dyadic motor skills, specifically in gross-motor locomotion, which hinders their ability to jointly act with their peers during a routine walking task. This calls for intervention to promote ASD-boys' social-motor development.

436.299 (Poster) Structure, Stability, and Clinical Correlates of Obsessive-Compulsive Behaviors in Youth with Autism

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Background: Distinct obsessive-compulsive behaviors (OCB) are common in youth with autism. However, there is limited understanding about the structure of OCB in autism and how it compares to the structure of this important clinical domain in other populations. Further, majority of previous investigations have focused on broad OCB domains rather than on specific behaviors, thus frequency and correlates of distinct facets of OCB in autism remain poorly characterized. The current study aimed to characterize the frequency and clinical correlates of OCB in youth with autism.

Objectives: To utilize Dimensional Assessment of Repetitive Behaviors (DARB)—a novel, comprehensive assessment of different aspects of restricted and repetitive behaviors, including OCB and large, representative of youth with autism to characterize OCB factor structure, frequency of specific facets of OCB and investigate their associations with key demographic, cognitive and clinical correlates.

Methods: Parents of youth with autism (N=1830) were recruited through the Simons Foundation Powering Autism Research for Knowledge (SPARK) cohort and completed the Dimensional Assessment of Repetitive Behaviors (DARB) and a series of dedicated measures of anxiety, externalizing and internalizing problems and sensory features. The DARB includes a subscale of OCB with 14 items. Item prevalence and severity was reported. We employed exploratory graph analyses (EGA) and confirmatory application of the exploratory structure equation modelling (C-ESEM) to characterize OCB structure. Generalize additive modeling was utilized to characterize the association between identified OCB factors with key correlates including anxiety, dysregulation, hypersensitivity.

Results: Majority of youth with autism endorsed at least one of the OCB. EGA indicated that the following four factors corresponding to hypothesized dimensions showed a good fit to the data in exploratory subsample: contamination, mental neutralizing, checking, and rumination. All items had excellent stability indices (.93-.1.0) and this structure was replicated 94% of the time. C-ESEM was run in confirmatory subsample demonstrating that noted four-factor solution had excellent fit (CFI=.988, TLI=.973, RMSEA=.048; SRMR=.022). Expected factor loadings (.515-.026) were higher than non-expected factors (.024-.370). Generalized Additive Models suggest that the four OCB factors were strongly associated central clinical challenges in OCD – anxiety, dysregulation, and hypersexuality. “Mental neutralizing” factors was also associated with IQ, social skills, and communication. There were no gender differences in OCB dimensions.

Conclusions: OCB are prevalent in autism and their structure is largely similar to OCB in obsessive-compulsive disorder. Although preliminary, findings reported here provide additional insights into clinical correlates of distinct OCB subdomains in autism.

436.300 (Poster) Synchrony and Flexibility in Parent-Child Interactions and Relations with Restricted and Repetitive Behavior
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Background: Parent-child interactions are critical for social, emotional, and linguistic development. Dynamic systems theory (DST) posits that the resilience of many systems, including parent-child interactions, can be characterized by the system's flexibility. Although flexibility is necessary, predictability is also critical for optimal development (Glynn & Baram, 2019), particularly within negative or hostile interactions. These dynamic features are influenced by the characteristics of both members of the dyad, as well as environmental/contextual factors. Although it has been suggested that restricted and repetitive behaviors (RRBs) may influence how parents interact with their children with autism spectrum disorder (ASD) and other forms of developmental disabilities (DD; e.g., Freeman & Kasari, 2013), no studies have yet investigated associations between RRBs and dyadic flexibility and positive synchrony among young children with DD and their parents.

Objectives: To test the relationships between RRBs and features of parent-child interactions among dyads with young children with DD/ASD.

Methods: Data from 35 parent-child dyads were analyzed. The children were aged between 2 and 6 years, and predominantly male (N = 24; 70.6%). All children met criteria for Global Developmental Delay, and most were diagnosed with autism spectrum disorder (ASD; N = 22; 64.7%). Brief (5-min) unstructured parent-child play sessions were recorded remotely. The quality and structure of the interactions were quantified using a measure of positive dyadic synchrony (i.e., the proportion of the interaction during which both members of the dyad were engaged in positive behavioral states) and a measure of dyadic flexibility (i.e., the rate per minute of dyadic behavioral transitions). RRBs were assessed the Repetitive Behavior Scale – Revised (RBS-R; Bodfish et al., 1999) with subscale scores based on the structure reported by Russell et al., 2019. Generalized linear models were used to regress dyadic synchrony, dyadic flexibility, and the interaction between these factors on each subscale score, controlling for child age, sex, and ASD diagnostic status.

Results: Dyads with ASD diagnoses had higher scores on all four RBS-R subscales and showed lower dyadic synchrony and higher dyadic flexibility, on average. The interaction between dyadic flexibility and dyadic synchrony was significant for the Stereotyped (p = .009), Self-Injurious (SIB; p < .001), and Compulsive Behavior (p = .007) subscales, but not the Ritualistic/Sameness Behavior subscale (p = .591).

For the three subscales with significant interaction effects, overall patterns of results looked similar, with the highest predicted values associated with low synchrony and high flexibility and/or high synchrony and low flexibility.
Background: Sensory processing difficulties are one of the hallmark features of Autism Spectrum Disorder (ASD). Individuals with ASD also exhibit heightened sleep problems as compared to their typically developing (TD) peers. Previous research has found a significant association between sleep and sensory processing difficulties in ASD (Mazurek & Petroski, 2015; Souders et al., 2017), however, it is not clear which aspects of sensory processing drive this relationship. This study investigated the relationship between sleep difficulties and sensory processing in youth with ASD using objective and subjective measures.

Objectives: To assess which domains of sensory processing difficulties are most strongly linked to sleep difficulties in youth with ASD using both objective (actigraphy) and subjective (parent-report) measures.

Methods: Participants were youth diagnosed with ASD (n=17, M_age=8.82, SD=3.41) and TD controls (n=11, M_age=11.09, SD=3.78) ranging from 6 to 17 years. ASD diagnoses were confirmed using the Autism Diagnostic Observation Schedule-2 and the Social Communication Questionnaire. Sensory processing difficulties were measured using the Social Profile-2 (SP-2; Dunn, 2014) or the Adult/Adolescent Sensory Profile (AASP; Brown & Dunn, 2002). Total raw scores for the SP-2 and AASP were converted into percentages to compare across both versions of the measure (Armstrong-Heimsoth et al., 2021). Caregivers reported on their child’s sleep via the Children’s Sleep Habits Questionnaire (CSHQ; Owens et al., 2000). Sleep was objectively measured via actigraphy and averaged over a consecutive 14-day period following assessment.

Results: Preliminary analyses showed that TD controls demonstrated a significant correlation between better actigraph averages of sleep duration (but not efficiency) and lower SP-2/AASP sensitivity (r=-.776, p<.05) and registration scores (r=-.779, p<.05; see Table 1). No significant correlations were detected between the SP-2/AASP and actigraph averages of sleep efficiency and duration in the ASD group. A significant relationship was found between CSHQ-Total and SP-2/AASP Quadrant scores across all groups. Elevated sensory seeking behaviors (r=.503, p=.009), elevated sensory avoiding behaviors (r=.496, p=.010), high sensitivity to sensory stimuli (r=.663, p=.001), and elevated sensory registration (i.e., missed detections of sensory stimuli; r=.548, p=.004) were related to greater sleep disturbance. Post-hoc analyses revealed that these relationships appear to be driven by the ASD group specifically, as higher CSHQ-Total scores were correlated with higher sensory sensitivity (r=.604, p=.017) in this group, especially driven by the tactile (r=.641, p=.025), and oral (r=.657, p=.020) domains on the SP-2/AASP. Further data collection is underway to increase sample size.

Conclusions: Our findings indicate that sensory processing difficulties are associated with sleep problems across all participants regardless of diagnosis. The association between sleep problems and elevated sensory seeking and avoiding behaviors highlight that sleep can be impacted by either form of sensory processing difficulties (i.e., seeking and avoiding), both of which are common in individuals with ASD. The insignificance between sensory processing and actigraphy in the ASD group likely reflects recent literature indicating subjective sleep measures are more consistently related to behavior in ASD than objective measures (Baddam et al., 2018). Future research should investigate how addressing tactile and oral sensitivities through intervention may help improve sleep in youth with ASD.

Background: Restricted interests (RIs), characterized by their intense focus on a restricted range of topics that interfere with other activities, are an under-researched component of autism. Research with autistic adults suggests that RIs are intrinsically motivated and maintained by feelings of competence in the skills related to their interests (Grove et al., 2018). Similarly, typical interests are maintained by fulfilling the psychological needs for competence, relatedness, and autonomy (Deci & Ryan, 1980), and through the integration of an intense passion into one’s sense of identity (Vallerand et al., 2003). Given research suggesting that interests may be used by autistic youth to facilitate social interactions (Sedgewick et al., 2018), it is worthwhile to investigate the purpose and motivations for these interests from autistic youth themselves.

Objectives: To understand and compare the motivating factors for intense interests in autistic and non-autistic children ages 6 to 12 years old.
Methods: Thirty autistic \((m_{age}=9.73, SD=1.91; 20 \text{ boys})\) and 22 non-autistic children \((m_{age}=8.84, SD=1.67; 12 \text{ boys})\) and their caregivers participated in the study. Caregivers completed the Social Responsiveness Survey, 2nd Edition (SRS-2) and a demographic questionnaire. Participants completed the Wechsler Abbreviated Scale of Intelligence, 2nd Edition (WASI-II) and completed a semi-structured interview investigating the characteristics of, and motivations for, interests adapted from Winter-Messiers (2007). The interview explored interest topics, how the interest started, behaviours associated with the interest, where and with whom their interest is pursued, how important these interests are to the youth, and the reasons for engaging in the interest. Interviews lasted between 6 and 21 minutes and were transcribed verbatim. An Interpretative Phenomenological Approach (IPA) was followed in the coding and thematic analysis of transcripts.

Results: Four themes were identified: social engagement and interaction, skill development, internal pressure and obsession, and escape. Many autistic and non-autistic participants indicated that their interests are socially motivated, although certain autistic participants demonstrated an absence of social motivation. The desire to overcome challenges and improve skills motivated interests in both groups and certain autistic and non-autistic participants were motivated to teach other people the skills they developed. Many autistic participants, and certain non-autistic participants reported obsessive thoughts about their interests, which greatly interfered with school, peer relationships, and home responsibilities. Other autistic and non-autistic participants demonstrated an intense engagement in their interests, but these did not interfere with other activities and were harmoniously integrated into their identity and positively contributed to their sense of self. Interests were also used by some to escape and cope with negative experiences such as bullying or family problems (e.g., divorce).

Conclusions: RIs are not disruptive or interfering in all autistic youth and may fulfill psychological needs for relatedness, competency, and autonomy. Interests may also positively contribute to a youth’s self-identity but may become problematic when thoughts become obsessive and the child feels pressure to pursue their interest. A better understanding of the motivation for RIs may help to facilitate peer interactions, social development, and identify sources of poor socioemotional functioning in autistic children.

436.303 (Poster) The Relationship between Picky Eating and Health Outcomes in Autistic and Non-Autistic Young Adults  
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**Background:** Concerns surrounding feeding behavior are a common occurrence for autistic people. Among these concerns is picky eating, which can lead to health negative outcomes including disordered eating, obesity, and mental health concerns. Picky eating is well known in autistic children, and our recent work suggested that this continues in young adulthood.

Research on long-term outcomes resulting from picky eating is sparse since most people outgrow the behavior after childhood; however, if pickiness persists into young adulthood for autistic people, it is imperative to better understand how and when it impacts their health. Moreover, research in broader samples of young adults suggests picky eaters may experience additional challenges surrounding eating behaviors, such as social anxiety, which could further exacerbate social difficulties for autistic people.

**Objectives:** This study aimed to broaden our understanding of picky eating for autistic and non-autistic young adults, and identify characteristics that may increase risk for potential mental and physical health outcomes.

**Methods:** The sample comprised 237 young adults aged 18 to 25, including 120 autistic and 117 non-autistic individuals. Food pickiness was assessed using a comprehensive assessment of preference and frequency of eating individual food items, assessment of preference based on food qualities, food neophobia (e.g., refusal to try new foods), and self-reported food pickiness (e.g., preferring variety or sameness in daily diet). Health outcomes assessed included: fear and avoidance of social situations using the Liebowitz Social Anxiety Scale, BMI, and current eating disorder diagnoses.

**Results:** Autistic young adults reported greater picky eating compared to non-autistic controls across multiple measures: self-reported picky eating \((p = .006)\), individual food item selectivity \((p = .002)\), food quality selectivity \((p < .001)\), and food neophobia \((p < .001)\). Autistic participants also reported significantly greater social anxiety \((p < .001)\), including both fear of \((p < .001)\) and avoidance of social situations \((p < .001)\), and were also more likely to report an eating disorder diagnosis than non-autistic young adults \((p = .001)\). Additionally, those with an eating disorder reported more food pickiness \((p = .003)\). Consistent with our hypothesis, self-reported picky eating and overall social anxiety were significantly correlated \((p = .009)\). Additional planned analyses further examine the structural model of diagnostic status, food pickiness, and health outcomes to determine how autistic picky eaters may differ from non-autistic picky eaters in young adulthood.

**Conclusions:** This study improves the understanding of food pickiness in autistic and non-autistic young adults by assessing multiple picky eating constructs and their relationship to mental and physical health outcomes. The results of this study underscore the need to assess picky eating in autism across the lifespan and to identify individuals who may have a higher likelihood of negative health outcomes related to food pickiness. Moreover, this can help inform development of evidence-based interventions related to picky eating in young adults.

436.304 (Poster) The Relationship between a Novel Clinician-Administered Sensory Measure and Analogous Parent-Report Measure in Children with Autism Spectrum Disorder
**Background:**

The nervous system takes in a range of stimuli from the environment, constantly adjusting the strength of response based on perceived importance of incoming stimuli. The DSM-5 includes altered sensory reactivity in its criteria for autism spectrum disorder (ASD). Most existing assessments measuring sensory behaviors (e.g., Sensory Profile 2 (SP2)) rely on caregiver report, although the recently developed Sensory Assessment for Neurodevelopmental Disorders (SAND) includes a clinician-administered observational assessment.

**Objectives:**

We examined the relationship between clinician-administered and parent-report assessments of how children on the autism spectrum, children with sensory processing concerns without ASD (SPD), and typically developing (TD) children respond to sensory inputs. We hypothesized scores of seeking on the SP2 would positively correlate with seeking scores on the SAND. We predicted that seeking and hyporeactivity behaviors would be positively correlated, especially in ASD, as this cohort may seek more intense stimuli to receive similar input.

**Methods:**

SP2 and SAND data were collected on 58 children between the ages of 3-4 years old (29 ASD, 11 SPD, 18 TD). The SP2 includes questions for parents about a child’s responses to stimuli across sensory modalities (Auditory, Visual, Touch, Movement, Body Position, and Oral). The SAND involves a clinician-administered observation and corresponding caregiver interview that quantifies a child’s hyporeactivity, hyperreactivity, and seeking across visual, tactile, and auditory modalities. To enable comparison between the measures, hyporeactivity on the SP2 was defined as the sum of Seeking and Registration quadrants, and hyperreactivity as the sum of Avoiding and Sensitivity quadrants. Pearson correlations were used to evaluate the association between corresponding SP2 and SAND domains, and between different domains on the same assessment. Given our sample sizes, we focus on analyses involving children from all cohorts, although future analyses will examine these correlations within each individual cohort.

**Results:**

There was a positive correlation between the SP2 and SAND in the seeking domain (r = 0.577, p < .01) and hyperreactivity domain (r = 0.446, p < .05), but not in the hyporeactivity domain. Paradoxically, the hyporeactivity and hyperreactivity domains on the SAND measure are positively correlated (r = 0.384, p < .05).

**Conclusions:**

The correlation between seeking domains & hyperreactivity domains on both measures suggests parents’ perception of these behaviors in their children corresponds with the clinician-administered observation and corresponding caregiver interview in the SAND. The positive correlation between hyporeactivity and hyperreactivity domains on the SAND mirrors the positive correlation previously seen on preliminary data from our group using the SP2. This paradoxical finding may suggest that children who over-respond to certain stimuli may under-respond to others, or that neural circuit mechanisms leading to sensory over-responsivity at some times may lead to under-responsivity at others. More effective classification of sensory preferences will enable better analysis of brain-based signatures; these profiles will guide us towards a more robust understanding of underlying biological mechanisms in sensory behaviors.

436.305 **(Poster)** The Relationships between Emotions about Stimming and about Special Interests in Autistic High School and College Students


**Background:**

Stimming and special interests (SIs) are common characteristics of autistic individuals. Stimming and SIs share some common functions, including their use as emotion regulators (Kapp et al., 2019; Winter-Messiers, 2007). SIs and stimming have been found to trigger feelings of enthusiasm and joy (Winter-Messiers, 2007). However, stimming is often stigmatized (Kapp et al., 2019).

**Objectives:**

1. Analyze if stimming and SIs both produce more positive than negative emotions (Kapp et al., 2019; Winter-Messiers, 2007).
2. Assess whether stimming produces fewer positive vs. negative emotions than SIs, potentially due to the stigma surrounding stimming (Kapp et al., 2019).
3. Discover whether students characterize stimming and special interests as coping mechanisms (e.g., dispel negative emotions).
4. Assess whether older students are more likely to have identified their SI special interest than younger students because they will have had more time to develop their interests.

Methods:

23 autistic students (M_age= 16.78; Table 1) who participated in a game design and employment workshop answered questions about stimming and SIs via a survey before and after the workshop. Responses were qualitatively coded by independent coders. Inter-rater reliability >88.8%.

Results:

Most students (n=19) already knew their SI(s) before the workshop. There was no relationship between age and knowing one’s SI (p=.65). 56% of participants reported STEM SIs; 13% reported creative and natural world SIs.

Participants reported more positive feelings about SIs than stimming (p=.0003; Table 2). Participants more frequently reported positive feelings about SIs (p=.0026), but less frequently reported positive feelings about stimming (p=.0347) than would be expected by chance. Participants reported negative feelings about stimming (p=.0026) and SIs (p=.01) less frequently than would be expected by chance, with no difference between the two (p>.05).

Participants reported using SIs for emotion regulation less frequently than would be expected by chance (p=.0005), and reported using stimming for emotion regulation as frequently as would be expected by chance (p=.20), with no differences between the two (p=.16). There was a negative correlation between age and use of stimming for emotion regulation (r(21)=-.69, p<.001) but no relationship between age and use of SIs for emotion regulation (p=.86).

There was a negative correlation between age and positive feelings associated with stimming (r(21)=-.54, p=.008) but no correlation between age and positive feelings associated with SIs (p=.49).

Conclusions:

Findings provide limited evidence for the use of either stimming or SIs for emotion regulation. SIs triggered more positive feelings than stimming. Older students were less likely to use stimming as an emotion regulation tool, and to have positive feelings while stimming. This could be due to a heightened awareness of the stigma surrounding stimming. The small sample size and high representation of STEM SIs limit the generalizability of findings. Another limitation is that this research is correlational, and thus, cannot determine if stimming or SIs directly cause the emotions participants reported. Future research should gather larger samples and evaluate if stimming and SIs cause specific emotions.

436.306 (Poster) Trajectories of Sensory Symptom Severity and Core Symptom Severity in Autism Spectrum Disorders

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Background: The study of changes in symptom severity across time is a key factor in Autism Spectrum Disorder (ASD) research, as it is considered a neurodevelopmental condition. So far, the literature on severity symptoms trajectories in ASD shows mixed results. A commonly reported pattern in previous studies shows that most of the participants (>80%) follow a stable symptom trajectory, while a minority of the sample shows significant change (improvement or worsening) in their symptoms. However, some recent studies have reported higher rates of change, with around 50% of participants following a changing severity symptom trajectory.

Objectives: Our goal is to study the trajectories of symptom severity in a sample of participants with ASD and to explore the relationship between them. We focus on three main areas: sensory alterations, social-communicative skills, and restrictive interests and repetitive behaviours.

Methods: 457 participants with ASD were evaluated longitudinally as a part of the multi-centre EU-AIMS Longitudinal European Autism Project (Charman et al., 2017, Loth et al., 2017). The Short Sensory Profile (SSP), the Autism Diagnostic Observation Schedule (ADOS), and the Social Responsiveness Scale, Second Edition (SRS-2) parents form were applied at two time points, 12 to 24 months apart. We studied trajectories of symptom severity by estimating the individual change per year for each symptom and establishing a threshold of significant change.
Results: We used a hold-out validation approach (70%-30% for training and hold-out sets). The training sample consisted of 317 participants with ASD (age range: 6-30.6 years, 28.7% females). Different sub-samples were used for the analyses based on the availability of scores at the two time points for each participant and test (SSP, ADOS, SRS-2). Regarding sensory symptoms (n=88), the 76.14% of the sample followed a stable severity trajectory, while a 14.77% and 9.09% showed improving and worsening trajectories, respectively. Symptom stability measured using the ADOS (n=160) ranged from the 57.7% to the 64.37% of the sample, with the ADOS Restrictive Repetitive Behaviours subscale (ADOS RRB) showing the greater proportion of change. Finally, almost 70% of the participants showed stable trajectories for the symptom severity using the SRS (n=92). Furthermore, we found a significant correlation (r=-0.65, p<0.05) between the change in SRS-2 total scores and the change in SSP total scores.

Conclusions: In this study we explored the severity trajectories for sensory, social, and restrictive repetitive behaviours symptoms in a sample of participants with ASD. In general, participants showed stability in their symptoms, with the proportion of participants following stable trajectories for the different tests ranging from 57.7% to 76.14%. Besides, we found that the change in severity of sensory symptoms across time was directly correlated with the change in core ASD symptoms.

436.307 (Poster) Understanding Family Mealtime Challenges in Autistic Children: The Role of Feeding Self-Help Skills
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Background: Self-feeding is an important milestone in a child’s development with independent self-help skills emerging by 18 months of life. Up to 84% of autistic children have feeding difficulties with the most common challenge discussed in the literature involving sensory-based food selectivity. However, essential aspects of feeding and the mealtime process, such as independence in self-help skills, have not been well characterized in autistic children or considered in the context of independence during family mealtime.

Objectives: The purpose of this study was to characterize feeding self-help skills using a large national sample of young autistic children with feeding challenges and explore the relationship between child independence and family mealtime.

Methods: The cross-sectional study uses data from the Survey for Characterizing Feeding Challenges in Autistic Children. Data from 427 caregivers of autistic children (ages 2 to 12 years) with feeding challenges was included. Children were an average age of 8.42 years old (SD = 2.95 years). The Feeding and Eating in Autisim Together (FEAST) assessment was used to assess feeding challenges. Descriptive statistics were used to describe child’s feeding challenges including level of independence in feeding and self-help skills. A composite score of child’s feeding independence was created using independence in four feeding self-help skills (use of fork, spoon, open cup, and straw). Pearson’s r correlations were used to explore relationships between feeding independence composite and other family mealtime variables.

Results: Data collected identified 21.78% of autistic children needed assistance in at least three of the four measured self-help skills (fork, spoon, open cup, and straw), while 53.86% needed assistance in at least one area. See Table 1 for additional self-help descriptives. However, child age was only moderately correlated with the self-help composite score (r= 0.32, p<0.001) and mildly correlated with child eating independently (r=0.17, p<.001). Small significant correlations were identified between the self-help composite score and mealtime variables including caregiver preparing a separate meal for the child (r=−0.18, p<.001), child willingness to accept new foods when offered (r=0.14, p<.001), and child’s feeding challenges disrupting family mealtime (r=−0.10, p=0.04). Additional significant relationships between child independence and mealtime variables will be presented.

Conclusions: Challenges with independent feeding in autistic children can significantly impact family mealtime and adult support required for successful eating. While the majority of autistic children in the study were mostly independent in self-help skills, many required assistance in skills that would be expected for the included age range of 2 to 12 years. In our sample, there was only a moderate correlation between self-help skills and age, which could indicate delays in self-help skills are a significant feeding concern. Future research focused on interventions targeting self-help skills to support increased independent feeding during mealtime could greatly benefit both the development of the child and the success of family mealtime.

436.308 (Poster) Understanding Sensory Fluctuations in Autistic Adults; Profiles, Causes and Coping Strategies.
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Background: Research suggests autistic individuals can experience both hyper- and hyporeactivity within a single sensory domain (Elwin et al., 2012). However, these fluctuations in sensory experience are not currently captured in commonly used sensory questionnaires (e.g. Sensory Profile 2 and Sensory Perception Quotient). Additionally, most sensory assessments focus on vision, audition, olfaction, gustation, tactile, but neglect interoception, vestibular, and proprioception. To date, there has been no research exploring experiences of sensory fluctuations across the full range of sensory modalities. It is key to understand these nuances of sensory experience, not only because it significantly impacts on autistic people, but also because it allows for the development of theoretically sound and valid assessment tools.
Objectives: A mixed methods (quantitative/qualitative) approach was used to answer five questions: 1) what is the frequency of hyper- and hyporeactivity across all senses; 2) what is the frequency of sensory fluctuations across all senses; 3) how do autistic adults experience sensory fluctuations 4) what are perceived causes of sensory fluctuations 5) what strategies are used to manage sensory fluctuations.

Methods: Thirty-eight autistic adults (24 women, 5 men, 9 non-binary, M\_age=29.29) completed a sensory questionnaire online. Diagnosis was confirmed using Ritvo Autism and Asperger Diagnostic Scale-14 (RAADS-14) and the Autism Quotient-10 (AQ-10). Content analysis was used on closed questions and inductive thematic analysis was used to generate themes from the open questionnaire data to provide a rich picture of sensory experience in autistic individuals.

Results:

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub theme</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-being</td>
<td>Mental</td>
<td>“stress/tiredness/agitation level can combine with a smell to make me feel slightly nauseous.” P27</td>
</tr>
<tr>
<td></td>
<td>Physical</td>
<td>“…i’m really sensitive to some touch... i’ve broken my toe and managed fine.... but then i cannot cope with someone patting my hand…” P31c</td>
</tr>
<tr>
<td></td>
<td>Representation of self</td>
<td>“Just try to give my body things it might like (tea, snacks) until it stops whining” P49</td>
</tr>
<tr>
<td>Cognitive aspects</td>
<td>Preparation/Routine</td>
<td>“Set predictable routines for eating and sleeping and self-soothe or medicate when things go bad.”</td>
</tr>
<tr>
<td></td>
<td>Mental Stimulation</td>
<td>“Smells can be extremely distracting at times..., I cannot focus until I have figured out what they are.” P50b</td>
</tr>
<tr>
<td></td>
<td>Level of Awareness</td>
<td>“I really don’t know, sometimes I just feel completely differently about being close to people…” P35</td>
</tr>
<tr>
<td>External aspects</td>
<td>Daily activities</td>
<td>“It can make me feel more hesitant to do certain physical activity as I don’t want to injure myself.” P17</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>“…very unpredictable, ..my partner has become increasingly anxious about spontaneously showing affection” P8</td>
</tr>
<tr>
<td></td>
<td>Characteristics of sensory input</td>
<td>“in the rain and/or wind massively increases my awareness and I absolutely love the feeling.” P50a</td>
</tr>
</tbody>
</table>

Conclusions:

The figure shows sensory differences and sensory fluctuations are prominent in autistic adults. Hyporeactivity was most reported for internal senses (proprioception/interoception/vestibular) whilst hyperactivity was most reported for external senses (vision/olfaction/audition/gustation/touch). The impact of these sensory differences is wide and complex, affecting physical, mental, and social well-being. The perceived causes of sensory fluctuations are complex and can interact with coping mechanisms. These findings emphasise the need to include sensory fluctuations in theoretical frameworks and in measures of sensory experience.

436.309 (Poster) Using Immersive Virtual Reality (VR) to Understand the Inner Perceptual World of Diagnosed Autistic Participants: Multiple Case Studies

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Background:

Sensory reactivity in autistic individuals, and how this differs from that of non-autistic individuals, has been extensively documented in the literature (for a recent example, see MacLennan, O’Brien & Tavassoli, 2022). It could therefore be argued that the perceptual experience of autistic individuals, and how it is interpreted, is qualitatively different. Links between sensory information processing and cognitive processing have led to theories, such as Weak Central Coherence and Enhanced Perceptual Functioning, which attempt to explain distinctive autistic performance in cognitive tasks. Historically, this ‘above average’ and/or distinct behaviour was described in terms of “islets of ability.” Recent discoveries have given rise to the concept of “autistic intelligence”, which is defined as a qualitatively different type of intelligence that relies less on verbal comprehension than standardized tests (Russell et al, 2019; Roth, 2020).

Virtual Reality (VR) techniques have the potential to create highly immersive environments that are realistic, safe and highly configurable. In the last decade, many branches of psychology have embraced this new technology to conduct easily regulated and ecologically valid experiments. Building on our previous work (Savickaite, et al, INSAR, 2020) using VR to explore autistic perceptual differences, we broadened our scope in an attempt to understand how tools available in VR can help autistic individuals communicate their perceptual experiences.
Objectives:

Our aim was to use the open-source VR drawing package – OpenBrush, to help diagnosed autistic participants describe their perceptual experiences.

Methods:

A total of 6 autistic participants were recruited for this study (4 male and 2 female). Mean age of participants was 22.66 years (SD = 3.44). Participants self-reported their autism diagnoses and also spoke about their diagnosis journey.

OpenBrush allows the user to draw freely in three dimensions in VR and has, in addition to standard pen-like tools, effects like snow and flames. Participants were asked to draw using this tool with minimum instructions. Experimenters provided some standard prompts, similar to those utilised in art therapy, to help participants get started. Videos of the drawings and audio of participants’ comments were recorded and later analysed using reflexive thematic analysis (Clarke et al, 2015).

Results:

Differences in creative styles and perceptual experiences were revealed. Three themes emerged from the VR experience of the participants: immersion, creativity, and escapism. In terms of daily experiences, three other themes emerged: autistic perception, masking/camouflage, and communication (see Figure 1).

Examples of drawings produced by participants are presented Figure 2.

Conclusions:

This exploratory study demonstrates how VR can be successfully applied to qualitative studies on autistic perception. Autism narratives clearly differ between individuals and settings. Bringing positive aspects of autism (i.e. less focus on ‘impairments’ or ‘deficits’) to the forefront could thus aid in the construction of a more nuanced narrative. In our study we demonstrate how free drawing can bridge the communication gap, allow for free self-expression, useful self-exploration and support creativity.

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Background:

Sensorimotor integration deficits are highly prevalent in persons with autism spectrum disorders (ASD). Specifically, sustained, online motor control is impaired, and it is associated with the severity of core ASD symptoms. Online motor control relies both on integrating sensory feedback with motor output and forming memories of recent sensorimotor experiences. Our prior studies of visually guided precision gripping, found increased variability and regularity of force output in persons with ASD relative to controls, especially when visual feedback was disrupted, indicating that patients are over-reliant on visual feedback for online, precision motor control. When visual feedback was removed and participants attempted to maintain the same force level, patients showed a greater rate and magnitude of force decay than controls, suggesting that impaired visuomotor memory also may contribute to online motor deficits in ASD.

Objectives:

The present study aims to clarify the contributions of visual feedback (force variability, regularity, 0-4Hz power) and visuomotor memory (force decay) processes to online motor deficits in persons with ASD.

Methods:

Sixty-eight participants with ASD (21F, IQ: 103.8±15.9) and 44 controls (28F, IQ: 112.0±11.8), aged 9-35 years, completed tests of precision gripping with (Vision) and without (No Vision) visual feedback. For Vision trials, participants pressed on force sensors with their dominant hand index finger and thumb while viewing a stationary target bar and a force output bar that moved up with increased force. They were instructed to press so the force output bar reached and matched the target bar throughout the 15s trial. No Vision trials started...
the same way, but after 3s, the force output bar disappeared. Participants were instructed to continue pressing at the same level until the end of the trial (12s later). To assess visual feedback processing, force variability (coefficient of variation), regularity (sample entropy), and 0-4Hz power were examined. Force decay latency, slope, and magnitude were examined to assess visuomotor memory.

Results:

Relative to controls, persons with ASD showed elevated force variability across conditions ($t_{(44.91)} = 6.92$, $p < 0.0001$) and increased force regularity in the Vision condition only ($t_{(50.00)} = 2.03$, $p = 0.043$). Overall, the ASD group showed greater decay magnitude ($t_{(50)} = 2.15$, $p = 0.034$) and a greater age-associated reduction in decay magnitude than controls ($t_{(50)} = 2.05$, $p = 0.045$). Decay slope and latency showed no group effects. Moderate correlations were observed between autism severity (ADOS-CSS) and force variability ($r_{\text{Vis}} = -0.34$, $p = .02$; $r_{\text{NoVis}} = 0.29$, $p = .05$) and regularity ($r_{\text{Vis}} = -0.29$, $p = .05$).

Conclusions:

Our finding that the ASD group showed deficits in force regularity only when visual feedback was available supports that visual feedback processing, independent of visuomotor memory, contributes to online motor control deficits in patients. Greater decay magnitude and corresponding age-related reductions in patients relative to controls suggests that atypical neurodevelopment of visuomotor memory may also contribute. However, decay slope—a more direct measure of visuomotor memory—showed no group differences, limiting the interpretation of visuomotor memory impairment. Additionally, only force variability and regularity, particularly in the Vision condition, were associated with ASD symptomatology, emphasizing the importance of visual feedback processing issues to online motor deficits and to understanding neurodevelopmental mechanisms of ASD.

436.311 (Poster) Visual Motion Perception during Visually Guided Motor Behaviors in Autism Spectrum Disorder

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Background: Sensory and sensorimotor issues are common in autism spectrum disorder (ASD). Specifically, motion perception is altered in ASD which can lead to disruptions in multiple aspects of development including impairments in visually guided motor behaviors. However, neurophysiological processes associated with visual motion abilities and their impact on visuomotor behavior in ASD remain unclear as examination of motion perception during motor behavior is limited.

Objectives: Develop a more mechanistic understanding of visuomotor impairments in ASD by studying visual motion processing during behavior and functional brain connectivity.

Methods: Fifty-nine autistic individuals (ages 10-33 years) and 44 age-matched neurotypical controls completed a lab-based visuomotor task. A subset of these individuals also completed an fMRI visual motion perception task. During the lab visuomotor task, participants pressed opposing load cells with their thumb and index finger. Participants viewed a static red target bar and a white force bar and were instructed to press the load cells when the target bar turned green, so that the force bar reached the level of the target bar. Participants completed the task across three visual gain conditions, in which the vertical distance the force bar moved in response to force output was manipulated. We examined the variability and complexity of the force output across visual gain conditions. During the fMRI visual motion task, participants passively viewed visual stimuli moving similar to the lab task, but they did not press. We examined brain activation and functional connectivity in key visual motion regions (V1, V3, and V5) during visual motion processing in contrast to rest. We also examined how visuomotor behavior, brain activation, and brain connectivity each were associated with sensory and clinical issues in ASD.

Results: During the visuomotor task, autistic individuals showed decreased force complexity relative to neurotypical controls during lower visual gain conditions only (group x visual angle: $p = 0.007$). There were no differences in force variability. During the fMRI visual motion task (visual motion vs. rest), there were no differences between autistic individuals and neurotypical controls in brain activation or connectivity in V1, V3, or V5; however, autistic individuals showed increased caudate activation compared to neurotypical controls. Decreased force complexity was associated with more severe social communication difficulties in ASD ($r = -0.53$, $p = .002$). Greater change in force complexity across gain conditions was marginally associated with more severe self-reported sensory sensitivity in ASD ($r = 0.40$, $p = .066$).

Conclusions: Our finding of reduced force complexity during lower gain conditions suggests that autistic individuals show an overreliance on visual feedback to carry out precision motor behaviors. Counter to our hypothesis, visual motion processing networks functioned similarly in ASD and neurotypical controls, though increased caudate activation in ASD suggests a greater reliance on subcortical networks to inhibit planned motor behaviors during passive viewing of motion. These findings indicate that differences in visually guided motor behaviors may reflect alterations of visuomotor brain networks rather than alterations in basic visual processing. We also found

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associations between visuomotor behaviors and core sensory and clinical symptoms implicating shared neural mechanisms underlying motor impairments and core ASD symptoms.

436.312 (Poster) What Are the Repetitive Behaviors That Discriminate Young Autistic Children from Typical Children across Early Development? a Direct and Quantified Behavioral Observation

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Background: Repetitive behaviors (RBs) are a central part of autism spectrum diagnostic (APA, 2013) although they are also documented in typical development (Leekam et al., 2007; Uljarević et al., 2017). Based on a repertoire of RBs, Jacques et al. (2018) demonstrated that compared to age-matched typical children, young autistic children exhibited a greater frequency and duration of three repetitive behaviors: hand flapping, close gaze at objects and arm movements. However, this study did not investigate the trajectory of the RBs in young children, and how their putative specificity interacts with age.

Objectives: Determine if specific RBs discriminate young autistic children from typical children and if these group differences change with age.

Methods: One hundred and twenty-one autistic children aged from 26 to 74 months (M=50.86) and 110 typically developing children aged from 19 to 73 months (M=44.39) were exposed to the Montreal Stimulating Play Situation (MSPS; Jacques et al., 2018). The 48 RBs listed in a previously built repertoire (see Jacques et al., 2018) were coded by two naïve raters using the Observer XT 11. Comparative multifactor analyses were conducted including individual discriminatory effects and interaction effects of group and age. Bonferroni corrections led to an adjusted alpha level of 0.001.

Results: A significant group by age interaction was observed for frequency of throwing objects, which increased in typical children, but remained low and stable in autistic children. There were no other significant group by age interactions. A main effect of group was found for the duration of close gaze at objects and spinning around and for the frequency of arm movements, putting objects in mouth, putting objects on cheeks, lateral glances at objects and close gaze at objects. All the above behaviors were displayed more in the autistic group. Finally, there was a main effect of age for the duration of holding objects in hands as well as for grouping objects according to their perceptual properties and for the frequency of flapping and spinning objects. In both groups, holding objects in hand and hand-flapping diminished with age, while grouping objects according to their perceptual properties and spinning objects increased with age.

Conclusions: Group effects are observed for several RBs. Some of these RBs, like arms movements and visual explorations, but also other perception-based exploration behaviors, seem to be very rare in typical development. Variation in the trajectory of behaviors by age in both groups underscores the importance of accounting for age when studying RBs. These results highlight the importance of characterizing and quantifying individually frequency and duration of RBs.

436.313 (Poster) What Motor Features Can Tell Us about Daily Living Skills and Brain Structures in Autistic and Non-Autistic Individuals

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Background: Motor features are commonly reported in autistic individuals (Bhat et al., 2020) and have been linked to differences in adaptive behaviors (Fears et al., 2022), and daily living skills (Travers et al., 2017). Moreover, motor features may serve as a window into how the brain develops in autistic and non-autistic individuals. However, we are only beginning to understand which specific daily living skills may be most impacted by motor features and which specific brain structures may be underscoring motor differences in autistic individuals.

Objectives: 1) Identify how daily living skills and motor performance are related in autistic and non-autistic children, examining which specific daily living tasks are most highly linked to motor skills. 2) Use diffusion weighted and structural magnetic resonance imaging (MRI) to identify which brain structures are related to motor performance in autistic individuals, using a randomized controlled trial (RCT) of balance training.

Methods: Study 1 (Travers et al., 2022) used a descriptive study design to examine the associations between caregiver-reported daily living skills (Vineland) and standardized motor assessment using the Bruininks-Oseretsky Test of Motor Proficiency (BOT-2 short form) in 101 children (37 autistic children), ages 6.0-10.9. Study 2 (Surgent et al, 2021) used an RCT design to examine pre- and post-training changes to daily living skills and the white matter of the brain in 34 autistic and 28 non-autistic adolescents.
Results: Study 1: Multiple regression examined daily living standard scores as a function of BOT-2 standard scores (controlling for IQ) and found a significant quadratic relationship between motor and daily living skills. Ordinal logistic regression with the Vineland items showed that motor skills were associated with tasks of dressing, bathing, education, health management, cleaning/organization, meal preparation/cleanup, and safety. Study 2: Whole-brain voxel-based analysis found unique brain structures associated with balance training in the autistic group compared to the non-autistic group (fdr-corrected p<.05), even though behavioral balance gains were nearly identical (p=.88).

Conclusions: These two studies across two unique samples suggest that motor features are related to daily living skills (specifically to dressing, bathing, education, health management, cleaning/organization, meal preparation, and safety), but that 6 weeks of intensive balance training was not sufficient to increase daily living skills in adolescents. The brain imaging results further suggest unique alignment of brain-behavior relations in autistic individuals compared to non-autistic individuals, suggesting distinctive brain organization for balance performance in autism. Future research is needed to understand how distinctive brain-motor relations in autistic individuals develop from infancy to childhood and through adulthood. Taken together, these studies highlight the complex ways that motor behavior may influence daily activity and how motor behaviors may reflect unique brain organization in neurodiverse populations.

436.314 (Poster) Zooming on the Spectrum: Exploring the Relationship between Zoom Fatigue, Autistic Traits and Sensory Sensitivity

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Background: Since the onset of the COVID-19 pandemic, the use of video conferencing (VC) has become an integral part of everyday life. Its implementations range from staying in touch with loved-ones, to work-related meetings, remote learning, and e-health services. While VC appears a convenient alternative to meeting face-to-face for many, it may be challenging for others. VC is known to induce symptoms of mental and physical exhaustion. One potential factor that may contribute to these symptoms, collectively known as Zoom fatigue, is that compared to face-to-face meetings, VC requires increased cognitive and sensory demands, which in turn may lead to sensory overload. The extent to which Zoom fatigue is experienced varies from person to person, but individuals with autism spectrum disorder (ASD) in particular may be more susceptible to Zoom fatigue. The socio-communicative symptoms associated with ASD include atypical eye gaze patterns, ineffective use of nonverbal cues, and alterations in sensory processing, including hyper- and hyposensitivity to sensory stimulation. All of these symptoms may pose as potential risk factors for zoom fatigue.

Objectives: This study aimed to examine the relationship between symptoms of Zoom fatigue, autistic traits and sensory sensitivity.

Methods: A large online survey was conducted among older adolescents and young adults with typical development and individuals in the same age range with a clinical diagnosis of ASD. Zoom fatigue was measured using the recently developed Zoom Exhaustion & Fatigue (ZEF) scale. Autistic traits were measured using the Autism Spectrum Quotient (AQ), and sensory sensitivity was measured using the Glasgow Sensory Questionnaire (GSQ). Bivariate and partial correlation coefficients were calculated to determine the relationships between these outcome measures.

Results: Data collection is ongoing and will be completed by February 2023. Preliminary data from 225 participants (184 females, 35 males, 6 non-binary, mean age: 19.45, range: 17-30 years) showed that increased autistic symptomatology was associated with increased symptoms of Zoom fatigue (r = .41, p < .001). This relationship remained significant after controlling for sensory sensitivity (r = .15, p = .03). These preliminary results suggest that, in addition to increased sensory demands, individuals with ASD may face unique challenges in the use of VC. Future analyses on the final sample will be presented at the conference, and will examine whether sensory sensitivity may act as a mediator between autistic traits and zoom fatigue.

Conclusions: Given that VC is now an intricate part of our society and is becoming increasingly more common in education and mental health services, it is important to examine how this increased digitalization of society affects the psychological well-being of neurodiverse populations such as individuals with ASD. Our preliminary results suggest that individuals with ASD may be more susceptible to symptoms of mental and physical exhaustion induced by VC. While more research is needed to examine the underlying mechanisms of this relationship, these findings may help increase awareness of neurodiversity in the field of computer-mediated communication, and may provide an impetus for the development of neurodiversity-sensitive solutions aimed at making computer-mediated communication more accessible and inclusive.

436.315 (Poster) Psychometric Evaluation of the Multidimensional Inventory of Sound Tolerance in Adults (MIST-A): A Novel Self-Report Measure Assessing Decreased Sound Tolerance Symptomatology in Autistic and Non-Autistic Adults

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Background: Difficulty tolerating environmental sounds, referred to hereafter as Decreased Sound Tolerance (DST), is among the most prevalent and impairing sensory features of autism, occurring to a clinically significant degree in an estimated 50–70% of the autistic population (Williams et al., 2021). Despite a sizable body of literature describing this symptom cluster and its prevalence in autism, there has been relatively little work evaluating the psychometrics of measures of DST for use in autistic individuals. Moreover, measures developed to date have typically focused on only one domain of DST symptomatology rather than tapping symptoms of all major disorders of sound tolerance [i.e., hyperacusis (the perception of sounds as excessively or painfully loud), misophonia (intense and excessive emotional responses to specific “trigger” sounds such as chewing, tapping and, sniffing), and phonophobia (a specific phobia of sound)].

Objectives: To assess the psychometric properties of the Multidimensional Inventory of Sound Tolerance in Adults (MIST-A; http://dx.doi.org/10.13140/RG.2.2.10492.28802/1), a novel self-report measure of DST designed to assess hyperacusis, misophonia, and phonophobia symptoms simultaneously in both autistic and non-autistic adults (including adults with other neurodevelopmental conditions [e.g., ADHD] and adults with clinically significant DST unrelated to a neurodevelopmental condition).

Methods: Data were drawn from several large-scale survey studies of general-population adults and various clinical populations (total N=2225), including 1470 general-population US adults recruited from the Prolific crowdsourcing platform (Mage=32.46±12.51 years, 51.3% female sex, 2.2% autistic), 447 adults with a neurodevelopmental condition (i.e., autism and/or ADHD; Mage=34.59±11.36 years, 74.9% female sex, 64.0% autistic, 61.7% ADHD), and 308 adults without diagnosed neurodevelopmental conditions who reported clinically significant DST (Mage=35.85±12.72, 74.8% female sex). The MIST-A latent structure was evaluated using exploratory graph analysis (EGA) and exploratory structural equation modeling, and multiple-group item response theory models (graded response models) were fit to each subscale individually to allow for further psychometric evaluation of subscale scores.

Results: EGA (Louvain algorithm) indicated that the MIST-A comprised four subdimensions, interpreted as: Anger/aggression/misophonia, Loudness/overwhelm/fear, Anxiety/avoidance, and Pain. An exploratory structural equation model based on these four dimensions demonstrated borderline adequate global fit (CFI=0.955, TLI=0.933, RMSEA=0.084, SRMR=0.018). Examination of local misfit indicated that the “Loudness/overwhelm/fear” factor contained both “Loudness/overwhelm” and “Fear/panic” sub-dimensions. Unidimensional graded response models fit to the five MIST-A dimensions each demonstrated adequate fit (all TLI>0.964, all RMSEA<0.054, all SRMR<0.059) in the combined multiple-group sample, and strong reliabilities (empirical rs=0.799–0.911). Both clinical groups (autistic/ADHD adults and non-autistic/ADHD adults with mixed DST conditions) scored on average 1–1.5 standard deviations above the general population mean on all MIST-A subscales. Convergence was strong between MIST-A subscales and other dimensional measures of hyperacusis and misophonia (e.g., Inventory of Hyperacusis Symptoms, Duke-Vanderbilt Misophonia Screening Questionnaire), although correlations between theoretically distinct MIST-A subscales were higher than expected.

Conclusions: The newly-developed MIST-A appears both reliable and valid as a multidimensional tool to assess several facets of DST symptomatology in both autistic and non-autistic adults. This measure is among the first to screen for hyperacusis, misophonia, and phonophobia simultaneously, potentially conferring clinical utility for differential diagnoses of DST conditions.

Service Delivery/Systems of Care

Panel Discussion — Service Delivery/Systems of Care

216 - Improving Services for Externalizing Behaviors: Correlates, Unmet Needs, and Potential Service Solutions

Panel Chair: Mindy Scheithauer, Pediatrics, Emory University School of Medicine, Atlanta, GA

Discussant: Lee Wachtel, Neurobehavioral Unit, Kennedy Krieger Institute, Baltimore, MD

Behaviors such as aggression, irritability, and elopement are a prevalent concern among individuals with autism spectrum disorder (ASD). These behaviors can interfere with access to services, community integration, and are a major stressor for families. While there are some evidence-based treatments available, families often encounter barriers when accessing these treatments. This panel will delve into important considerations for service delivery for severe, challenging behaviors. The first mixed-methods study highlights the role of externalizing behaviors in accessing appropriate care for individuals with profound autism. Next, we present correlates of challenging behavior that should be considered when determining the population most at-risk, and thus most at-need for services. The final two studies discuss potential service solutions. First, we present outcomes from a clinical trial of a manualized, time-limited intervention model for elopement and implications for improving accessibility. Last, we discuss standardizing clinical pathways for irritability and related diagnoses to improve service delivery. This panel confronts issues in service delivery through a holistic approach, focusing on identifying areas of need through listening to the voices of parents, determining which individuals are most at-risk for needing treatment, and exploring potential service-delivery models to increase accessibility of services.

216.001 (Panel Discussion) Improving Services for Individuals with Profound Autism: A Mixed Methods Study of Caregiver Perspectives
Background: The notable underrepresentation of individuals with profound autism in the research literature has resulted in limited knowledge about their service needs and a lack of evidence-based practices tailored to these needs (Stedman et al., 2019). Profound autism is linked to increased symptom severity and a greater likelihood of challenging behaviors, which can overwhelm and debilitate families without access to appropriate care. Thus, emotion regulation concerns regarding both internalizing problems and externalizing behaviors are critically important to consider in the context of service needs for individuals with profound autism. The current study sought caregiver perspectives on profound autism service needs and treatment priorities in order to guide future treatment development.

Objectives: To identify patterns of service needs and treatment priorities for adolescents and adults with profound autism through quantitative and qualitative caregiver reports.

Methods: A mixed-method (QUAN -> QUAL) study design examined frequency and predictors of unmet service needs and caregiver perspectives on service utilization, barriers to service access, and service priorities. Quantitative survey data was gathered from 423 caregivers of adolescents and adults with profound autism. As part of the survey, caregivers completed the Emotion Dysregulation Inventory (EDI; Mazefsky, Day, et al., 2018), a measure of emotional distress and regulation skills. Binomial logistic regressions were conducted to ascertain the effects of demographic and clinical characterization variables on the likelihood of unmet service needs (“my child is receiving” = 0, “my child is not receiving, but needs” = 1) for the top 6 services with the greatest frequency of unmet needs. Qualitative interviews (n = 20) were coded and thematically analyzed to expand upon service needs and priorities for profound autism.

Results: The skills of recognizing emotions and calming down when upset (56.5%) and decreasing aggressive or self-harm behaviors (55.8%) were rated as priority treatment targets. Additionally, child’s behavior problems were endorsed as a barrier to service access by 54.1% of caregivers in the survey. Increasing EDI reactivity scores corresponded with an increased likelihood of needing social club/activity groups (B = .05, p = .015). Higher EDI dysphoria scores were associated with an increased likelihood of needing social skills training (B = .033, p = .044), life skills training (B = .074, p < .001), and behavioral support services (B = .043, p = .006). Qualitative interviews revealed that caregivers face many barriers to service access, including a lack of qualified service providers, long waitlists for behavioral services, one-size-fits-all service models, and exclusion from services due to the severity of behaviors and low adaptive functioning skills. Caregivers detailed the challenges associated with managing severe behaviors with limited assistance from service providers.

Conclusions: Findings highlight the lack of services for individuals with profound autism and the debilitating impacts of severe, challenging behaviors. Results underscore the importance of developing and increasing access to therapies to reduce challenging behaviors in individuals with profound autism. Such therapies have the potential to enable individuals to enjoy subsequent skill building efforts and ultimately improve the quality of life for families.

216.002 (Panel Discussion) Biopsychosocial Correlates of Challenging Behavior in Children and Adolescents with Developmental Disabilities

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Background: Challenging behaviors, often referred to as disruptive behavior or externalizing problems, are associated with a range of conditions and frequently occur in people with neurodevelopmental disorders, including children with autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD). There is very little prior research examining the occurrence of challenging behaviors in children with neurodevelopmental disorders while controlling for biopsychosocial correlates like parental variables and environment.

Objectives: The first aim of this study was to evaluate group level differences for challenging behavior by neurodevelopmental condition status. The second aim was to evaluate the relative contributions of clinical features, child demographic characteristics, and parent and environmental factors towards their child’s challenging behavior.

Methods: Study participants (n=2004) were recruited from the Prolific Academic online data collection service. Participants completed the following: demographic information, child’s cognitive level, Open Source–Challenging Behaviors Scale including its five subscales: (property destruction, aggression, elopement, conduct problems, and self-injury), Stanford Social Dimensions Scale, and the Executive Functioning Scale. Four mutually exclusive strata were created for study participants: neurotypical (NT), ASD, children without ASD but have ADHD, and children without ASD or ADHD but with other developmental disabilities (DD). Descriptive statistics, univariate analyses of covariance, and a series of hierarchical linear regressions were computed.

Results: Parent-reported ASD diagnoses were supported by strong differences in autism traits between ASD and non-ASD groups (d=1.79). Male children were over-represented in the ASD group (76%) and at least 80% of all groups were reported as White race. Children in the
DD group had higher rates of co-occurring diagnoses. The mean social function score was lower for the ASD group, while the executive functioning score was lower for the DD group. After controlling for age and sex, challenging behavior total scores were highest in ASD, next highest in ADHD without ASD (ASD vs. ADHD without ASD, p=.039), and slightly lower but still elevated in the Other DD group (ADHD without ASD vs. Other DD, p<.001), with a distinct pattern for ASD and ADHD groups across challenging behavior types (Figure 1). For prediction of total challenging behavior scores, clinical features and child characteristics made statistically significant contributions; while, caregiver and environmental factors did not significantly increase prediction (ΔR²<.01). Overall prediction was strongest for property destruction (R²=.41) and conduct problems (R²=.50) and weakest for self-injury (R²=.22).

Conclusions: This study was the first of its kind to explore biopsychosocial correlates of challenging behavior in children with neurodevelopmental disorders. ASD, and secondarily ADHD, had elevated levels of challenging behavior relative to other DD groups and neurotypical controls. Findings from predictive models strongly suggest that clinical features are the most important factors to consider in addressing challenging behavior in youth, with executive functioning being a major neurobehavioral construct that should be examined more closely in future studies. Future research would benefit from examining how specific forms of challenging behavior influence child and family outcomes. Existing work suggests that a child’s challenging behavior, as a diverse set of behaviors, has a strong correlation with parent and family stress and coping.

216.003 (Panel Discussion) Implementation of a Manualized Function-Based Elopement Treatment

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Background: Elopement is an incredibly dangerous behavior that is prevalent among individuals with autism spectrum disorder (ASD). Fortunately, there is evidence for successful behavioral interventions reducing elopement. However, support for these interventions has primarily come from small-N studies with variable procedures across studies. Additionally, most research on elopement treatment employs specialized facilities and providers that are not readily available in most geographic areas. Thus, families of children who engage in dangerous elopement often face barriers in accessing appropriate treatment services for elopement.

Objectives: The current study evaluated a manualized function-based treatment for elopement that is intended for implementation in the home and community setting by BCBAs without specialized training in elopement or challenging behavior. In this presentation, we highlight outcomes impacting accessibility of this novel manualized intervention, including the feasibility of implementation and acceptability. We also present preliminary efficacy data.

Methods: We conducted a clinical trial of 76 participants (age 4-12) diagnosed with ASD whose parents endorsed elopement as a primary presenting concern. Participants were randomized to either a manualized elopement treatment or a parent education control group. The manual includes a parent-mediated intervention, with 12 appointments held across 16 weeks, where a therapist coaches the parent through implementing safety measures in the home, a functional analysis, and subsequent behavioral treatment strategies. We measured the percentage of appointments completed, therapist integrity, and caregiver acceptability (based on the Treatment Acceptability Rating Form at endpoint). For a subset of participants, we evaluated initial feasibility using secondary outcomes. The week before baseline and endpoint, parents recorded each day for one week whether elopement occurred. They also completed an elopement questionnaire consisting of 30 items representing situations elopement is common and rated how concerning elopement is in that setting on a nine-point Likert scale.

Results: Therapist fidelity was high (> 90%; random sample of 20% of appointments) and parents found the treatment acceptable: > 80% agreed they were satisfied with the program; found the treatment acceptable; and would recommend the program to others. In evaluating the first 32 participants randomized to treatment, several participants were not able to complete all appointments (69% completed ≥ 10 appointments). For initial feasibility, we evaluated secondary outcomes with 54 participants using a repeated measures ANOVA with time (baseline vs. endpoint) as the within subject and group (treatment vs. control) as a between subject variables. We identified significant improvement in the elopement questionnaire (F(1,53) = 14.26, p <.01) and in the percentage of days caregivers reported elopement (F(1,52) = 11.08, p <.05).

Conclusions: We found that the treatment was acceptable to parents and therapists were able to follow the manual with high integrity. However, parents were inconsistently able to attend the full 12 appointments in the 16-week time frame. Thus, it is possible that additional measures need to be taken to promote attendance or allow flexibility in scheduling. It is also possible that the COVID-19 pandemic impacted attendance. Initial feasibility results suggest promise for efficacy of the manual, which will be further evaluated in future analyses.

216.004 (Panel Discussion) Using Improvement Science to Standardize Care for Challenging Behaviors

Background: Data from parent report of challenging behavior in the Autism Care Network indicated behavior symptoms tended to cluster around three primary mental health conditions: anxiety, Irritability, ADHD. We describe our use of quality improvement methodology in a multi-center learning health network to improve the reliable implementation of practice pathways for the identification and treatment of anxiety, irritability, and ADHD.

Objectives: To standardize the reliable implementation of clinical care pathways that a) screen for challenging behaviors, and b) increase identification and management of anxiety, ADHD and irritability and associated challenging behaviors through implementation of best practices.

Methods: Network participants had previously developed evidence-informed best practice clinical pathways for treatment of ADHD, anxiety and irritability based on literature review and network research. Quality improvement science guided the formation of “learning labs” focused on reliable pathway implementation for each of these conditions. Markers of reliable pathway implementation were identified and bundled, permitting assessment at each site on consistent implementation of each marker as well as the overall bundle. Based on the Science for Improvement, sites use PDSA cycles to redesign strategies for optimal local implementation and to track data over time using Run Charts with on-going QI support. Chart reviews of children seen by clinicians at each site are conducted bi-monthly to assess the reliability of clinical uptake using four levels <80% reliability (Chaos), 80-89% reliability (Level 1), 90 – 98% reliability (Level 2), and ≥ 99% (Level 3). Participating sites receive centralized QI support, shared data and strategies for successful system changes to increase reliability.

Results: Through the first 11 rounds of data sampling, aggregate results from participating centers demonstrate improvements in at least one pathway marker, with most reaching at least level 1 reliability (80% or above). Aggregated learning lab data indicates overall improvements in the reliable implementation of the practice pathway “bundle” for all three associated conditions. For the ADHD pathway, reliability averaged 16% over the first three rounds and improved to an average of 45% over the final three rounds. Similar improvements were seen for anxiety (22% to 46%) and irritability (2% to 46%). Additionally, there is Network-wide improvement on the critical marker of asking about patient safety concerns (average of 72% on the first three rounds and an average of 90% on the final three rounds). Learning lab reliability work continues and updated data and future directions will be presented.

Conclusions: The Science for improvement can be used to increase reliable implementation of best practice pathways. Standardizing care in clinical settings is imperative to better understand what works or doesn’t work with specific autism subtypes and to track outcomes over time. Further work is planned to link improvements in the reliability of pathway implementation to outcomes.

ORAL SESSION — SERVICE DELIVERY/SYSTEMS OF CARE

323 - Increasing Knowledge & Strengthening Partnerships to Advance Supports

Moderator: Sarah Spence, Autism Spectrum Center, Boston Children’s Hospital, Boston, MA


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Background: People on the autism spectrum are learning about autism from more diverse sources of information that likely differ in the quality, portrayal, and nature of the information they offer. Sources of information that are more medicalised (e.g., Professionals, Parents; Crane et al., 2019; McCormack et al., 2020), stereotyped or incomplete (e.g., Movies/Television, News Media; Jones & Harwood, 2009) could negatively influence the accuracy of individuals’ autism knowledge, their experience of stigma, and may present an identity threat that influences the development and expression of an autistic identity (Dirth & Branscombe, 2018). However, given the rise of the neurodiversity movement and greater diagnosis in adulthood (Harmens et al., 2022), self-directed learning from less traditional sources (e.g., advocates, social media, online blogs) that may be more neurodiversity affirming, may positively influence the development of an autism identity, and the expression of this through more strengths-based means.

Objectives: This present study investigates where autistic people learn about autism, and whether their information source is associated with their level of autism knowledge, perceptions of stigma, and development and expression of an autism identity.
Methods: Participants were 198 autistic adults (M_age = 34.89, SD_age = 12.34; 29.3% male; 56.1% female; 14.6% non-binary) more frequently diagnosed in adulthood (M_age = 27.36, SD_age = 16.32). Participants were recruited via social media, mailing lists and from autism community groups. Participants rated on a 7-point Likert scale how much nine potential sources of autism knowledge (Professionals, Parents, Autism advocates, Television/Movies, The Media, Books/Journals, Social Media, Online Blogs, Online research) influenced their understanding of autism. Participants also completed measures of autism knowledge, internalatisation of stigma, endorsement of an autistic identity, as well as masking and promoting autism special abilities.

Results: Overall participants tended to learn more about autism from professionals, autism advocates, books/journals and online research than they did from parents, television/movies and the media (see Table 1). Participants also indicated additional avenues for autism information, namely friends, others with autism, family members, their own experience/observations, and other experts. Correlational results (Table 1) showed that conventional sources such as professionals and parents tended to be associated with more internalised stigma, lower belief in special abilities, and lower autism identity. Contrastingly, online blogs and social media as sources of knowledge were associated with lower stigma, greater endorsement of an autism identity and the expression of this through autism strengths, as well as more accurate autism knowledge.

Conclusions: The findings raise questions about how authoritative sources of information (e.g., professionals, parents) discuss autism, and the potential impact this may have on how autistic people understand and express their own autism identity. While these results may be tempered by the late diagnosis of the participants, it highlights the potential value of alternate autism affirming sources of information in promoting positive outcomes for autistic adults.

Background:

Caregivers of children with autism and other developmental disabilities (DDs) often experience challenges such as feeling stressed, facing stigma and social exclusion. Social determinants further impact how caregivers can raise their children. Families in low-resource settings may be constrained by poverty and lack access to information, resources, and services. Existing work globally suggests that caregiver empowerment has a range of beneficial outcomes. Studying similarities and differences in how caregiver empowerment is achieved across settings can help inform how to tailor empowerment approaches to specific contexts.

Objectives:

We aimed to analyse similarities and differences in perceptions of the role that caregiver empowerment may play in service development for caregivers of children with DDs, and how empowerment may be achieved in two settings: Ethiopia and Argentina.

Methods:

We used a phenomenological, qualitative multiple case study design. We conducted two case studies: in Ethiopia (including 63 individual interviews) and Argentina (32 interviews). Participants in both settings comprised caregivers of children with DDs, clinicians, representatives of non-governmental organisations and of local health, education, and social care authorities; and additionally teachers in Argentina, and community health extension workers in Ethiopia. We used thematic template analysis to compare data across the case studies, using Murdoch et al.’s 2016 framework on the role of context in complex interventions.

Results:

We developed three themes: “Societal factors influencing the caregiver experience: the macro level of context”; “Caregiver empowerment through institutions and communities: the meso level of context”; “The challenges of the caregiver journey: the micro level of context”. A key similarity across the two case studies was that caregivers’ socio-economic status, stigma and awareness about DDs and existing disability laws shaped how caregivers could exercise their agency. Caregiver initiatives remained local and informal in Ethiopia, while in Argentina formalised caregiver organisations worked towards claiming their rights. In Ethiopia, where only mothers were interviewed, the caregiving role was mostly restricted to women. Participants from Argentina, including mothers and fathers, indicated that gender-specific support would be helpful to support fathers in their caregiving roles. In both countries, caregivers and professionals highlighted that
Caregivers’ psychological resilience was difficult to achieve due to distress, social exclusion and stigma. Many Ethiopian caregivers highlighted how their faith and spiritual beliefs helped them give meaning to their experiences. Unlike Ethiopian parents, Argentinian caregivers added that internet access helped them form support groups online. Beyond caregiver empowerment, both Ethiopian and Argentinian caregivers suggested that they expected the government to facilitate service development for their families.

Conclusions:
Both Argentinian and Ethiopian stakeholders consider the goal of caregiver empowerment to be the removal of barriers that hinders caregivers from doing what they think is best for their child and family, in their own terms. This requires structural change to overcome social exclusion. Based on participant views in the two case studies, caregiver-focused interventions should build on existing expertise by experience to empower caregivers and work across sectors to overcome access barriers. A key intervention component should be supporting caregivers in accessing information about DDs and local services available.

323.003 (Oral) Prevalence, Characteristics and Healthcare Utilization Among US Children with Parent-Reported Severe Autism

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Background: In 2022 a Lancet Commission proposed the administrative term “profound autism” apply to those who require the constant presence of a caregiver to meet their safety and care needs and who are likely to have significant intellectual disability and very limited language. While this term has been broadly defined, little is documented in terms of prevalence or differences in characteristics compared with those without profound or severe autism.

Objectives: Using a nationally representative survey of US parents we: (1) estimated the prevalence of parent-reported “severe” autism, and (2) compared parent-reported child characteristics (developmental, cognitive, adaptive profiles, co-occurring conditions) between children with severe autism and mild/moderate autism.

Methods: The 2018-2019 National Survey of Children’s Health (NSCH) was used to identify children ages 6-17 years with autism and their parent-reported autism severity (“mild”, “moderate” or “severe”). We compared child and family sociodemographic characteristics and child characteristics (developmental, cognitive, adaptive profiles, co-occurring conditions) among children with severe autism with those having mild/moderate autism, adjusting for significant sociodemographic factors in multivariable analyses.

Results: The overall prevalence of autism among US children aged 6-17 years was 3.2%. Among these children (n=1,368), the proportion with parent-reported “severe” autism was 10.1%. The prevalence of severe autism, compared with mild/moderate autism, was similar across gender, age and race/ethnicity but higher among children with public insurance. Parents of children with severe autism were more likely to report language delay, developmental delay, intellectual disability and “severe” ratings of all three. Children with severe autism had more parent-reported difficulty walking, climbing stairs, dressing and bathing. With regards to physical health, parents of children with severe autism were more likely to report gastrointestinal problems and overweight/obesity but not insomnia or epilepsy. Compared with children with mild/moderate autism, those with severe autism had a higher parent-reported prevalence of depression and were less likely to stay calm when faced with a challenge. They were not more likely to have parent reported behavioral problems, ADHD or anxiety but were more likely to have “severe” parent ratings of all three. Lastly, parents of children with severe autism were significantly less likely to rate their child’s overall health as “excellent/very good”.

Conclusions: Utilizing a nationally representative parent survey of school-aged children, we found the prevalence of severe autism to be 0.3% or 1 in 333, comprising 10% of children on the autism spectrum. Compared with parents of children with mild/moderate autism, parents of children with severe autism were more likely to report many of the same defining characteristics of severe or profound autism proposed by experts, supporting the proposal for a separate administrative term. Given their distinct characteristics in the areas of development, cognition, adaptive skills and co-occurring conditions, children with severe autism and their families may benefit from this designation in order to obtain personalized services and supports. Our findings have implications on tracking the ongoing prevalence of severe autism and characterizing the experiences and needs of these children and their families using subsequent iterations of the NSCH or other parent surveys.

323.004 (Oral) Building Primary Care Partnerships to Improve Access to Diagnosis and Management of Autism Spectrum Disorder

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Background: There is widespread acknowledgement that the need for autism evaluation and support services far outweigh the capacity to address in specialty clinics. Equipping primary care providers (PCPs) to be skilled and confident in identifying autism and supporting the care needs of their patients can expand critical access to appropriate care (Hyman, et al, 2020). This is particularly true in underserved, rural/remote communities where specialist care is unavailable.

Objectives: Develop a multi-faceted model for building community partnerships between PCPs and specialists by providing training to equip primary care providers with skills, knowledge, and access to consultation so that concerns for autism and healthcare management for patients with autism may be more effectively addressed in primary care.

Methods: Primary Care Provider (PCP) education included 4 training opportunities: 1) a 10 week didactic virtual series via Extension for Community Healthcare Outcomes (ECHO) on Autism Core Concepts (ACC), 2) virtual training on the Screening Tool for Autism in Toddlers (STAT), 3) PCP engagement in interdisciplinary Outreach Diagnostic Clinics at rural/remote clinics with a Developmental Behavioral Pediatrician, and psychologists (including a Spanish bilingual/bicultural psychologist), and 4) a monthly Community of Practice (CoP) with case review and an interdisciplinary team. These 4 educational approaches were designed to improve PCP skills and confidence to identify concerns for autism, diagnose clearer presentations of autism, and address ongoing healthcare needs of youth with developmental concerns. ACC, STAT, and CoP ECHO participant demographics and number of participants per session were collected in Qualtrics. Post STAT surveys were obtained using Microsoft Forms. STAT pre and post comfort-level data were measured with 5-point Likert scale and analyzed with dependent t-tests.

Results: Eleven cohorts including a total of 156 participants completed the ACC training (93% PCPs and 79% Medicaid providers). Three annual STAT trainings included 49 participants. STAT participants demonstrated significant improvement in provider comfort to identify symptoms of ASD, pretest (SD = 3.63(0.83), post-test = 4.42(0.69), p=0.001. STAT participants were “extremely likely” to recommend the course, 9.05/10. A total of 8 diagnostic outreach clinics, including 39 developmental evaluations were completed by interdisciplinary teams at 5 clinics in rural/remote settings. Evaluations included the ADOS-2 in partnership with PCPs in the program. The CoP included 29 participants (50% rural/remote communities), across 33 monthly sessions with an average of 4.6 attendees per session. Three champions were identified as frequent participants of the CoP and participated in outreach clinics in their communities.

Conclusions: Combining the training approaches of the ACC, STAT, PCP participation in outreach clinics and CoP constitutes an innovative, multifaceted approach for improving the confidence and comfort of PCPs in underserved areas for the provision of timely diagnostic identification and care for youth with autism and developmental concerns. The encouraging results suggest high acceptability and improved confidence following training. Further, providers who were frequent attendees of the CoP continue to utilize the program to sustain and improve care. Future directions include evaluating changes in PCP practices to identify concerns, diagnose autism, and enhance healthcare management for this population.
Background: Telehealth can address barriers that influence access and adherence to services, particularly for families in underserved groups (Dahiy et al., 2020). Telehealth has been shown to reduce staff shortages, cut costs, increase enrollment capacity, and service frequency (Camden & Silva, 2021; Rooks-Ellis et al., 2020). Using multiple methodologies to gain a comprehensive understanding of challenges experienced when providing telehealth can support successful implementation.

Objectives: This study examines quantitative and qualitative data to identify clinicians’ perceived barriers to delivering telehealth ABA services.

Methods: A convergent mixed methods design (QUAN + qual) was used to identify perceived barriers to telehealth and gain a comprehensive understanding of clinicians’ experiences with this modality. A total of 389 clinicians providing ABA telehealth services to autistic children completed an online survey distributed through the Behavior Analyst Certification Board. The survey included closed- and open-ended survey items related to challenges experienced when delivering telehealth. A list of common barriers to telehealth use was created using previous literature examining telehealth for broader mental health services. Items were then tailored to autistic children and families. Clinicians rated these barriers using a 5-point Likert-scale, as well as the Satisfaction Subscale of the Technology Usability Questionnaire. Clinicians were also provided an open-ended question to report on their experienced barriers. A repeated measures ANOVA was used to compare clinicians’ difficulty implementing specific services (assessment, direct treatment, parent training). Individual barriers were analyzed using descriptive statistics. A principal components analysis (with varimax rotation) was conducted with the barrier items to identify meaningful subscales. Pearson’s correlations and linear regression was used to examine whether the barrier subscales predicted clinicians’ satisfaction with telehealth. Open-ended responses were examined using thematic analysis.

Results: Clinicians rated providing direct services (M=3.52, SD=1.14) as more difficult than conducting assessments (M=3.29, SD=1.06), and both as more difficult than providing parent training (M=2.47, SD=1.11), F(2, 748)=162.26, p<.001. The PCA indicated a 3-factor solution of barriers related to: Technology (α=.82), administrative tasks (α=.88), and client characteristics (α=.88). The most frequently endorsed barriers were related to client characteristics: Working with children who elope (M=4.37, SD=.81), exhibit challenging behavior (M=4.31; SD=.83), need behavior management (M=4.11; SD=.91), or are preverbal M=4.08; SD=1.00). Technology barriers (r=-.34, p<.001), administrative task barriers (r=-.48, p<.001), and client characteristic barriers (r=-.62, p<.001) were each negatively related to telehealth satisfaction. Fewer reported barriers related to client characteristics and administrative tasks were independent predictors of telehealth satisfaction, with the total model explaining 39% of variance.

Four themes emerged from the qualitative thematic analysis: technological barriers (33% of comments), client engagement (22%), implementation of treatment strategies such as physical guidance and behavioral management (20%), and challenges related to caregiver involvement (21%).

Conclusions: Clinicians frequently reported challenges related to addressing specific client-level characteristics (such as engaging children who may struggle with attending or engage in challenging behaviors). Challenges related to client-characteristics and administrative tasks uniquely predicted clinician’s satisfaction with telehealth. These findings highlight the need for targeted strategies that facilitate telehealth use to address specific client needs.

**406.330 (Poster) A Mixed-Methods Examination of Perceived Barriers to Telehealth Delivered Applied Behavior Analysis**

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**406.331 (Poster) A Qualitative Exploration of Community-Based Providers’ Experiences Supporting African American Autistic Children and Their Families**
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Background: Historically marginalized families face service utilization barriers and cultural perspectives of disability that impact their decisions to seek and utilize autism support services. Black parents raising young children with autism encounter challenges with educators, related service providers, and healthcare providers who are not responsive to the needs of their families (Pearson & Meadan, 2018; Pearson et al., 2020; Pearson & Meadan, 2021). These challenges and other barriers to service utilization have harmful impacts on outcomes for Black children with autism, including delayed communication and challenging behavior (Wright, 2016).

Objectives: The research questions were: (1) What are the experiences of parent educators who provide support for Black families of children with autism in NC? (2) To what extent do parent educators feel confident in their knowledge of autism-related strategies and resources? (3) To what extent do parent educators feel prepared to address the needs of Black families of children with autism through parent-training?

Methods: This study was a qualitative focus group design. During each focus group, participants discussed their experiences supporting families of children with autism in NC, and identified their perceived needs for both parents and parent educators. Each focus group interview lasted 1-2 hours. Following a constant comparative method, we (1) read and recorded memos for each transcript independently, (2) met to reach a consensus on initial categories, (3) revised the categories as needed, (4) developed emerging themes across the data, and (5) conducted level-two member checks.

Results: Thirty-two participants were included in this study. Findings indicated that parent educators most often provided individualized support, identified racialized experiences, and assisted with school challenges for Black families raising autistic youth. Participants also identified a number of barriers to supporting Black families raising autistic youth, such as lack of service providers, geographic limitations, and waitlists, to name a few.

Conclusions: This study provides insight about the experiences of parent educators who work with African American families raising autistic children. Our findings indicate that there is a need for a concerted effort to (a) improve parent - teacher relationships among Black families, (b) engage in targeted outreach for Black families, (c) provide culturally responsive training for parent educators, and (d) provide more resources, services and service providers to better meet the needs of historically marginalized autistic youth and their families.

406.332 (Poster) A Randomized Controlled Trial of a Client Data Collection App Incorporating User-Centered Design and Behavioral Economics Insights
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Background: A critical component of evidence-based interventions for children on the autism spectrum is quantitative data collection to track progress. Often, one-to-one aides (“aides”) are the frontline staff responsible for data collection; yet many do not collect high-quality, quantitative data that is consistent, timely and complete. Two common practices inhibit data collection: 1) many agencies use labor-intensive pen-and-paper methods, and 2) aides’ work is by nature solitary, leaving few opportunities for timely supervisor feedback. To address these issues, we created a phone-based, behavioral health data collection application, Footsteps, using behavioral economics principles via user-centered design. Footsteps was designed to make data collection easier and more appealing via a simple digital interface, more timely via reminders to take data, and more rewarding by providing encouraging feedback after data collection.

Objectives: To test the feasibility of our recruitment strategies and test the response rate and sensitivity to change of our measures in a pilot trial of Footsteps, in preparation for a large-scale randomized trial. We also examined whether the mean differences between the treatment and control groups were in the anticipated directions.

Methods: Twenty-seven aides of students on the autism spectrum participated in a 3-week, school-based randomized controlled trial (RCT) of two versions of Footsteps: one with basic data collection features (control) and one with those features plus behavioral economics enhancements e.g., reminders and feedback; treatment). Our primary outcome measures were data collection consistency, timeliness, and completeness, collected through app analytics. Secondary outcomes included: 1) measures of intentions and determinants of intentions (attitudes, self-efficacy and norms) to estimate if these psychological constructs may mediate aides’ intentions to take data, 2) the System Usability Scale, and 3) a questionnaire regarding the app features’ usefulness. We analyzed quantitative trial results using generalized linear models (GLMs). We also conducted post-trial semi-structured interviews to better understand participants’ experience of the app as helpful, motivating, or challenging. We analyzed these data using thematic analysis guided by an integrated bottom-up/top-down approach.
Results: Despite conducting the study during a global pandemic, we recruited 90% of our anticipated sample, had an 88% response rate for all measurement periods, and saw meaningful variability in outcome measures. Groups differed at baseline on intentions (with the treatment group having stronger intentions than the control group); we controlled for this in the GLM analyses. Means were in the anticipated directions for 2 of the 3 primary outcomes, with the treatment group collecting more consistent and timely data; however, the control group had more complete data. Likewise, for the determinants of intentions, the treatment group had higher self-efficacy and better attitudes regarding data collection; however, injunctive and descriptive norms were higher in the control group. No treatment group contrasts reached statistical significance; however, all effect sizes except for attitudes were medium-large. Results of the survey and qualitative data indicated that Footsteps was usable, acceptable, helpful, and motivating to participants.

Conclusions: Results were encouraging and suggest the study methods are suitable to conduct a fully powered RCT.

406.333 (Poster) A Retrospective Chart Review of Delivering the Social ABCs As a Hybrid Model for Autistic Toddlers - Perspective from Goa, India

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Background: Evidence for early social-communication intervention catering to toddlers with autism in India is currently limited. The Social ABCs (Brian et al., 2016) is an evidence-based NDBI developed in Canada, for children diagnosed with autism aged 12-36 months. It aims to improve communication and social engagement, targeting functional vocal communication and sharing of positive emotions. The intervention was implemented from January 2021 at Sethu, a community-based child development center in Goa, western India. Autism intervention models in India have long been center-based, but the COVID 19 pandemic and subsequent lockdowns prompted Sethu to shift to remote delivery, with the option for caregivers to choose their preferred model as lockdowns eased.

Objectives: To report on the delivery, feasibility and acceptability of the Social ABCs for toddlers with autism in Goa from January 2021 - October 2022.

Methods: The Social ABCs Group Model is a caregiver-mediated intervention with 15 sessions held over 6 weeks. Local clinicians trained by program developers conduct a combination of group didactics and individual parent coaching sessions. Families whose toddlers were diagnosed with autism at Sethu were offered the Social ABCs as an early social-communication intervention with information on wait time, fees and format provided in advance. Decisions around participation, scheduling, fees, sponsorship and coaching were collaboratively made. Using a retrospective chart review we have examined family demographics, attendance, implementation fidelity and child responsivity.

Results: 55 toddlers aged 20-35 months along with a primary caregiver attended the intervention over 10 groups of 2 to 8 families per group. The average wait time to start was approximately 3 months post diagnosis. Caregivers that attended included 46 mothers, 8 fathers, and one aunt. Registration data indicated family barriers around ability to pay fees, scheduling conflicts, poor internet connectivity and home language being other than English. Steps undertaken to mitigate these challenges included flexibility on criteria of the participating caregiver, heavy concessions on fees and a hybrid model with the option to choose between center-based and remote delivery. 42% and 40% of caregivers chose the online and hybrid models respectively. 20% of families received concessions ranging from 60-100% of the session fee. 20% of families chose to be coached in local languages including Konkani, Hindi or Marathi. 87% of families completed the program. Based on video-coding, 75% of the caregivers achieved fidelity of implementation. Responsivity scores increased by an average of 40 percentage points in 100% of the toddlers.

Conclusions: These findings demonstrate the portability and feasibility of the Social ABCs, developed in Canada, for use in the Indian context. Even through the pandemic, the program was well received by families. The understanding of contextual limitations by local trainers led to adaptations that mitigated challenges and enhanced feasibility. Providing caregiver-mediated support at the very earliest signs of ASD is an innovative and resource-efficient approach to meeting families’ needs and has implications for other low-resource settings.

406.334 (Poster) Access and Cost of Services for Autistic Children and Adults in Italy

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Background: There is very little knowledge regarding autistic services access and costs in Italy.
Objectives: This study wants to improve understanding of current access to educational, health care, social and other related services for autistic persons of all ages in Italy and opportunities for improvement as part of the Autism Spectrum Disorder in the European Union (ASDEU) project.

Methods: An online survey of services attended in the 6 months prior to completion and their costs was filled out by Italian caregivers of autistic people with autism.

Results: 303 carers of autistic people responded to the survey. Most of the autistic cared were children<18 years old (82%) (mean age: 11.61±8.24, range: 1-54), males (82%), and lived at home with their parents (97%). Most of the autistic adults were students (21%) and unemployed-but willing to work (21%). Most of the carers were employed (49%), working 32.23±9.27 [3-50] hours per week. The 82% of the carers made some absences from work/place of study during the last 6 months because they had to take care of an autistic person, for a mean of 15.56±14.70 [1-120] days in the last 6 months. On average, carers reported that they spend caring for the autistic person 58.84±48.36 [2-168] hours per week.

More than a half (55%) of the autistic people received any form of support, 5% with any residential care services (e.g., temporary institutionalization for family problems or to provide support to family members/caregivers), and 6% suffered a hospitalization. The 34% of the carers reported that the autistic person has received outpatient hospital care (i.e., the person has not been admitted to hospital overnight but has visited in hospitals, clinics or other centres for diagnosis or treatment) and the 22% took any autism-related medication (i.e., for symptoms of autism spectrum disorder or autism-related conditions). In school or college, the professional with whom autistic people interacted the most was the support teacher (18.16±7.02, 2-45 h/week). The educational psychologist (80%), psychomotorist/physiotherapist (56%), and speech therapist (51%) were the professionals most often paid by carers of autistic children and the ones paid more per hour (mean: 31, 33, 35 euros, respectively). Carers also reported that the autistic children received one of the following forms of support in the last 6 months more often from: educator (74 h/w), group therapy (32), and speech therapist (31). Psychologist (75%) and counselling/individual therapist (78%) were the figures most frequently paid by the carers of autistic children. Carers of children reported that psychiatrist and psychologist the most expensive ones (153±105 [36-400], 105±97 [14-400] euros, respectively) and that the health or social care services they used more often were the psychiatric services (8±8 [1-24] times in the last 6 months).

Conclusions: The results showed areas for potential improvement in autistic services delivery in Italy to achieve support for families.

406.335 (Poster) Accessible Social Prescribing As an Approach to Meeting Autistic Adults’ Health and Wellbeing Needs

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Background:

Autistic adults are affected by health and social disparities that impact life expectancy and quality of life (Hirvikoski et al., 2016). A lack of post-diagnostic support may contribute to these inequalities. Responding to these inequalities through acute care is costly. Social prescribing, a low-level personalised care model receiving increasing attention from UK policymakers and commissioners, may offer opportunities to address isolation, life skills and health self-management. However, research has scarcely focused on provision of social prescribing for autistic adults, who may have different needs to non-autistic adults.

Objectives:

This presentation summarises findings of a PhD project which will aim to contribute to knowledge on the factors affecting accessibility and acceptability of social prescribing for autistic adults as a potential approach to responding to unmet health and social care needs. As a complex intervention with a range of models and mechanisms which vary at different stages of the pathway (Husk et al., 2019), the present research aimed to evaluate the mechanisms of the entire pathway from initial referral through to success of individual prescribed activities.

Methods:

The research involved a literature review and mixed-methods study. We extracted data from academic and grey literature on types of community-based services for autistic adults and their outcomes, settings and service pathways. An online survey with 128 autistic adults in the UK applied Raymaker et al.’s (2017) coproduced Barriers to Healthcare Checklist to explore the primary care point of access to social prescribing for different demographic groups across changing contexts using regression analysis. Semi-structured interviews with 21 autistic participants investigated meanings of wellbeing and how autistic individuals self-managed this, and attitudes towards social prescribing as a response to unmet needs. We applied reflexive thematic analysis with a critical realist ontology, as well as the candidacy...
framework which considers relational and systemic aspects of service access (Dixon-Woods et al., 2006; Mackenzie et al., 2013). The research was designed and conducted by a team led by an autistic PhD student.

Results:

Findings suggest that access to social prescribing for autistic adults via referral from health and social care services may be affected by patient and provider evaluations of candidacy, socioeconomic factors and context of service delivery. Self-determination was found to link themes relating to meanings of wellbeing for autistic adults. Social prescribing may promote self-determination through its tailored approach, such as the inclusion of intrinsic interests and connecting people with peers. However, existing models may require adaptations at different stages of the pathway by offering alternative referral routes and additional support engaging with prescriptions for autistic adults. Further evaluation will build on the established findings.

Conclusions:

Findings may enable service commissioners and policymakers to consider whether additional funding could support a discrete social prescribing pathway for autistic adults or upskill existing providers to adapt their practice for autistic adults. The research also adds to the growing literature on peer support and self-determination as important mechanisms for wellbeing in autistic people.

406.336 (Poster) Accuracy of the Screening Tool for Autism in Toddlers (STAT) in the Primary Care Setting


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Background: Community-based models for evaluation of young children at risk for autism spectrum disorder (ASD) may be one solution for reducing diagnostic delays and disparities. However, feasible and accurate observational assessment tools are needed for such evaluation models to be scalable. The Screening Tool for Autism in Toddlers (STAT) is a level-2 ASD observational tool with strong psychometric properties when used by ASD experts, and recent research has provided further evidence for STAT utility with non-specialists across community settings. To date, large-scale community-based studies of STAT accuracy are lacking.

Objectives: To evaluate accuracy of the STAT when used by primary care providers (PCP) across a statewide system for early ASD diagnosis. Specifically, we investigated agreement between STAT outcome and 1) PCP ASD diagnosis, 2) ADOS-2 classification, and 3) expert best-estimate clinical diagnosis of ASD. Finally, we examined clinical characteristics of children who received an inaccurate STAT ASD categorization.

Methods: Early Autism Evaluation (EAE) Hubs have been established in primary care practices across Indiana. EAE Hub PCPs are trained to conduct a standardized ASD evaluation of at-risk children (ages 14-47 months) and participate in a longitudinal learning collaborative. The EAE Hub evaluation includes administration of a DSM-5 focused caregiver interview and administration of the STAT. As part of a larger study of EAE Hub accuracy, 130 children (M=2.6 years; SD=0.6; 76% male; 71% non-Latinx White; 29% other race/ethnicity) from 7 EAE Hubs were evaluated in a follow-up blinded research-grade evaluation conducted by ASD experts (including caregiver DSM-5 ASD interview, Mullen Scales of Early Learning [MSEL], Vineland Adaptive Behavior Scales [Vineland-3], and Autism Diagnostic Observation Schedule [ADOS-2]).

Results: STAT ASD categorization matched EAE Hub PCP diagnosis in 86% of cases (STAT Fail, ASD diagnosis: 75/82; STAT Pass, non-ASD diagnosis: 37/48). STAT ASD categorization matched ADOS-2 ASD classification in 77% of cases (STAT Fail, ADOS-2 ASD: 80/104; STAT Pass, non-ASD outcome: 20/25). STAT ASD classification aligned with expert best-estimate clinical diagnosis in 78% of cases [102/130; true positive (TP)=58%; false positive (FP)=8%; true negative (TN)=20%; false negative (FN)=14%], with sensitivity of 0.81, specificity of 0.72, positive predictive value (PPV) of 0.88, and negative predictive value (NPV) of 0.59. Compared to TP, FN cases (STAT Pass; ASD outcome) were older (p=.005), more likely to identify as non-Latinx White (p=.02), and evidenced higher developmental (MSEL; p<.001) and adaptive (Vineland-3; p<.004) skills and lower ASD symptom severity (ADOS-2; p<.004).

Conclusions: Community-based PCPs trained as part of a statewide longitudinal learning collaborative for ASD evaluation can utilize the STAT to diagnose ASD in most young children. Overall, the STAT shows adequate accuracy characteristics when used by non-specialist PCPs. Our accuracy metrics suggest that, overall, most children who fail the STAT are likely to have ASD; however, children deemed not at-risk on the STAT often require more comprehensive evaluation for accurate diagnosis. Further, children for whom the STAT underclassifies ASD risk show a discrepant clinical profile. Findings have implications for training of non-specialist clinicians, specifically regarding identification of cases requiring referral for specialized ASD evaluation.

406.337 (Poster) In-Vivo and Virtual Reality Training Increases Autism Knowledge and Confidence for Law Enforcement Officers

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Background: Historically, law enforcement officers (LEOs) in the US are not well trained in autism spectrum disorder (ASD; Modell & Mak, 2008). Gardner and colleagues (2019) found the majority of LEOs reported they had no formal training in ASD, despite working in a state that has required ASD-specific training since 2016. Although law enforcement departments throughout the United States may provide autism training, these programs often vary widely in length, format and quality. In considering the ideal training format to increase LEO awareness of ASD, in-person training is considered superior to online training modules. Teagardin and colleagues (2012) provided ASD-related training to LEOs via video. The authors concluded that video training alone is insufficient to train LEOs on how to assess and respond to autistic individuals. Instead of video or online training, in-vivo training is recommended combined with opportunities for role-playing and hands-on activities to supplement training (Gardner et al., 2019). As a prevalent population within our society, an understanding of autism by LEOs is warranted; however, best-practices in training LEOs to increase ASD knowledge remains an under-researched area.

Objectives: The primary author created a training program for LEOs that prepares officers to respond to calls involving autistic individuals. This training includes a three-hour training utilizing in-vivo and virtual reality. LEOs who participated were asked to complete a pre- and post-training questionnaire that assessed knowledge of ASD and confidence in responding to calls with autistic people. The purpose of the present study was to determine if a combination of in-vivo and virtual reality training (a) impacted LEOs knowledge of ASD, and (b) increased confidence in responding to calls.

Methods: Sixty-six (N = 66) LEOs attended two separate training sessions. LEOs were 78.5% male with a mean age of 34.63 years (SD = 6.8) and 8.69 years of law enforcement experience (SD = 7.2). Most LEOs (n = 33; 52.4%) reported receiving prior training in autism. Each participant completed a pre- and post-training questionnaire assessing knowledge of ASD and confidence in responding to calls. Results: All LEOs who responded (n = 62; 94% of the sample) reported the training increased their understanding of autism. Likewise, all LEOs who responded (n = 61; 92% of the sample) reported the training would impact their professional interactions with autistic individuals. Younger LEOs with fewer years of experience reported greater increases in confidence. Increased knowledge and confidence did not differ by gender, previous autism training, or personal relationships with an autistic person.

Conclusions: Combined in-vivo and virtual reality training significantly increased pre- and post-test scores of LEO knowledge of autism and confidence in responding to calls for all participants. Younger LEOs with less experience responded with greater increases in confidence, which may indicate virtual reality as a viable training approach for younger officers. Future research should investigate the long-term impacts of autism training on LEO behavior and call outcomes from the perspective of both LEOs and autistic civilians.

406.338 (Poster) Addressing the Autism Waitlist Crisis: Using Project Echo As a Method of Increasing Diagnosis of ASD in Pediatric Primary Care
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Background: Individuals with autism spectrum disorder (ASD) are at high risk for unmet service needs. This is especially true for diagnostic evaluations, which have long waitlists due to limited access to specialists. Additionally, families in rural and underserved communities may be less able to access specialty care sites due to barriers such as distance and cost. To address this, Washington State initiatives an Autism Center of Excellence (COE) program certifying primary care providers (PCPs) to diagnose ASD and encouraged participation in ECHO Autism Washington: a year-long tele-mentoring program in identification, diagnosis, and management of ASD based on the Project ECHO model. Support was provided by an interdisciplinary team of specialists, including autistic self-advocates.

Objectives: We aim to confirm previous findings that participation in ECHO Autism increases provider confidence and decreases perceived barriers to providing diagnostic and care management support. We examine changes in diagnostic clinical practices and referrals. Qualitative interviews will contextualize how participation in ECHO Autism impacts provider practices.

Methods: Seventy-seven medical providers (23 of 39 Washington counties; 83% urban, 17% rural practice locations) enrolled in one year of ECHO Autism Washington. Information was collected pre-, mid-, and post-ECHO about confidence, perceived barriers, autism diagnostic practice patterns, and self-efficacy via a modified version of the Primary Care Autism Self-Efficacy (PCASE-M) survey. Non-ECHO COE providers served as a convenience sample comparison group. Diagnostic referrals from ECHO providers to Seattle Children’s Autism Center (SCAC) were tracked. Follow-up interviews were conducted with a subset of ECHO providers (n=19) to understand how ECHO influenced practice change and needed implementation supports. Purposive sampling was used to promote diversity of provider roles and location. Interviews were analyzed using emergent thematic analysis.

Results: After one year of ECHO, the number of autism diagnoses given by providers increased significantly (F(1, 65)=7.52, p=.008). Providers who attended more sessions reported making more diagnoses (F(2, 613.26), p=0.045). The average number of SCAC diagnostic referrals from ECHO providers significantly reduced during ECHO (t(43)=4.23, p<.001). ECHO providers reported making significantly more autism diagnoses than non-ECHO providers (t(40)=2.00, p=.05). The total number of reported barriers reduced (F(2, 61)=13.5, p<.001), and PCASE-M ratings increased in all areas, (F(2, 60)=24.21, p<.001), including knowledge of autism diagnostic criteria and...
confident in making independent autism diagnoses. Follow-up interviews indicate providers felt underprepared to diagnose ASD following initial state-level COE certification. Providers valued the ongoing education, case presentations, and supportive ECHO Autism community. They directly attributed increases in their diagnostic practice to their participation in ECHO.

**Conclusions**: ECHO Autism is an effective way to empower PCPs to diagnose autism in their own practices in community settings. Ongoing mentorship and support through ECHO are critical components of success. The ECHO model can be feasibly adapted to diminish the gap in unmet autism diagnostic service needs. Further, increased community capacity for diagnosis can reduce referrals to tertiary care sites and may increase access in rural or underserved communities. This may improve the quality-of-care families receive and increase access to those who face barriers accessing evaluation outside their primary care setting.

### 406.339 (Poster) Improving Healthcare Experiences for Autistic Individuals: A Scoping Review

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**Background**: Autistic individuals have increased need for accommodations in healthcare settings due to communication challenges, sensory sensitivities, behavioral rigidity and difficulty with transition. While previous literature has assessed some of the caregiver, patient and provider-reported barriers to care for autistic individuals, there has not been a scoping review of the literature on intervention effectiveness, inclusive of all potential healthcare settings.

**Objectives**: We sought to conduct a scoping review of the literature to explore existing studies on improving healthcare experiences for autistic individuals. We were particularly interested in understanding study setting, study design, sample sizes and intervention content.

**Methods**: Literature from January 2005 to October 2020 was reviewed via searches conducted by a medical librarian, using PubMed, EMBASE, CINAHL and PsychINFO. Hand searching was also utilized to capture new, relevant publications. Searches were limited to English-language articles and results were exported to Covidence review software for screening by the study team. Figure 1 summarizes the stages of the review. All abstracts and papers were reviewed by at least 2 authors at every stage.

**Results**: Thirty-eight studies met inclusion criteria and the majority (N=25) were completed in the United States. (Table 1) Dental settings were most common (N=12) followed by psychiatric and procedural settings (N=6 each). There were 3 randomized controlled trials (RCTs) with the majority of studies (N=17) being descriptive (e.g. chart reviews, cohort studies) or survey design (N=7). Interventions most commonly targeted pre-visit planning and preparation (N=13) followed by procedural support and accommodations (N=10). Three studies assessed large system change. The most common outcome assessed was procedural compliance (N=15). A total of 33 of studies (87%) had a sample size 100 or less. Cultural considerations were not addressed in any of included studies and only one study utilized feedback from autistic adults when developing the intervention.

**Conclusions**: Methodologically sound, outcomes-based studies of interventions that improve care of autistic individuals in healthcare settings are limited and contain small samples. Most of the research has been conducted in dental and perioperative based settings, due to the necessity for procedure completion with no studies completed within pediatric inpatient settings. Future work assessing intervention effectiveness must include the feedback of autistic individuals themselves.

### 406.340 (Poster) Assessing Provider-Reported Use of Evidence-Based Early Intervention Practices within Georgia’s State Funded Early Intervention System

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**Background**: Naturalistic developmental behavioral interventions (NDBIs) are considered a validated intervention approach for young autistic children and children who have an increased likelihood of being autistic (Schreibman et al., 2015). The use of NDBIs has been popularized through Early Intervention (EI) systems because they facilitate access to services for families with 0-3-year-old children with developmental delays (Aranbarri et al., 2021). Research has shown that NDBIs are used frequently by interventionists (Pickard et al., 2021); however, more research is needed to understand the provider- and system-level factors that influence practices in community-based EI systems and to develop solutions for better implementation methods (Stahmer & Aarons, 2009; Stahmer et al., 2019).
Objectives: Objectives of the current study are: 1) to examine provider-reported use of NDBI within Georgia’s Part C EI system; and 2) to examine the extent to which providers’ background, attitudes, and perceived organizational support predict use of NDBI strategies.

Methods: One hundred EI providers (Mage=47.2 years, SD=12.55) completed a survey including: 1) demographic information including age, gender, disciplinary background, and years of experience working within EI systems and with autistic children; 2) attitudes towards evidence-based practices (EBPs) (Aarons et al., 2009); 3) system-level resources and support to attend training (Lehman et al., 2002); 4) provision of family-centered care (King, King, & Rosenbaum, 2004); 5) delivery of NDBI strategies in their most recent session (Frost et al., 2020); and 6) level of experience with manualized NDBI programs (Frost et al., 2020). Descriptive statistics were used to examine provider reported NDBI use; linear regression models were used to examine factors predicting NDBI use.

Results: During their most recent session, providers reported using 5.74 (SD=2.69) developmental NDBI strategies (D-NDBIs) and 5.77 (SD=2.72) behavioral NDBI strategies (B-NDBIs). When looking at strategy frequency, providers reported verbally responding to the child’s attempts to communicate in about 74% of the session while directing the child to demonstrate new skills in about 46% of the session. D-NDBI and B-NDBI use was significantly predicted by provider openness and appeal to new interventions as well as providers’ self-reported use of family-centered care. The final models explained 35.0% and 31.6% of the variance in D-NDBI (F=4.836, p<0.001) and B-NDBI (F=4.152, p<0.001) use, respectively. Specifically, provider openness to new interventions explained a significant proportion of variance in D-NDBIs (b=0.546, t(70)=4.08, p<0.001) and B-NDBIs (b=0.491, t(70)=3.58, p<0.001).

Conclusions: Preliminary analyses suggest that provider openness to EBPs predicted greater use of D-NDBI and B-NDBI strategies, indicating that provider attitudes towards EBPs are important to consider when implementing interventions. System-level factors did not predict provider use of NDBI strategies. While provider reports offer a deeper understanding of their use of NDBIs, this research lacks the perspectives of children and families who are on the receiving-end of interventions. However, these findings provide insight on factors necessary for successful uptake of NDBIs within EI systems. Future directions include expanding survey measures to include the perspectives of families within EI systems and expanding the administration of provider-report surveys to compare evidence-based intervention implementation across multiple community EI systems.

406.341 (Poster) Autism CanTech!: Overcoming Barriers to Autistic Youth Post-Secondary Education and Employment in the Canadian Digital Economy through Holistic Supports

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Background: Canadian Autistic youth face high levels of unemployment, poverty and barriers in gaining and maintaining employment. Funded in part by the Government of Canada under the Youth Employment and Skills Strategy, Autism CanTech! (ACT!) is a pilot program aimed at studying the outcomes of providing Autistic-centred training and supports for Autistic youth (18-30) and employers. Using the lens of the social model of disability (Oliver 1983; 1990; 2013), ACT! aims to improve the employment outcomes of those with Autism and to ensure employers can foster inclusive work environments. ACT! aims to provide supports for both employers and Autistic youth to gain and maintain employment in the Canadian digital economy.

Objectives: To understand and redress barriers to post-secondary education and employment faced by the Autistic community and discover what supports and environmental factors create inclusive spaces for Autistic learners and workers to thrive within the Canadian digital economy.

Methods: The study focused on acquiring qualitative data, through semi-structured focus groups, interviews and secondary analysis of program evaluation data and outcomes of Autistic participants, ACT! Employer-Partners, their natural supports, and ACT! staff. Data was analyzed through Thorne’s Interpretive Descriptive method and situated within disability justice and labour, Oliver’s Social model of disability and intercultural human resource theories.

Results: Data identified that Autistic individuals experience barriers to accessing post-secondary education and employment (ie. Recruitment process; rigid environments; supervisory instruction; culture, etc.). Autistic individuals also experience “burnout” from ill-suited environments and are not equipped for advocacy. The tailored post-secondary experience, unique supports, and bridging to employment resulted in a 41% employment rate and 12.5% further educational attainment. ACT! dispelled attitudinal barriers within employer-partners and supported them throughout the program with training, and support from the Career Coaches and the ACT! Inclusion and Accessibility Consultant. Autistic workers, much like their neurotypical counterparts, can be successful in a variety of work environments, with strong individual preferences for both in-person and remote work, and an ability to adapt to the technologies provided for task management particularly when employers have been trained and supports are in place to meet their unique needs, provide clear communication, and provide concise task delegation. Removing post-secondary and employment barriers mitigates broader systemic barriers faced by Autistic adults. To fully thrive, Autistic adults also require supports from external society such as access to education, affordable sustained mental health supports, housing, transportation, and community, which can be partially mitigated through sustained employment.
Conclusions: In our study, Autistic learners and workers overall do not require specialized software to complete tasks but rather adequately trained educational and work environments that value inclusion and create processes for equitable approaches to meeting access needs. Employer partners benefit from tailored training in working with Autistic youth, confronting a lack of knowledge regarding the Autistic community. Additional community supports are needed for Autistic workers to thrive including adequate housing, transportation and consistent, sustained mental health supports. More research is needed regarding post-program sustained supports requested from both employers and Autistic youth as well as accessible pathways through post-secondary education.

406.342 (Poster) Autism Spectrum Disorder (ASD) in a Developing Country- Age at Diagnosis and ASD Comorbidities.
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Background:

A specialty community paediatric service was initiated in 2011 within a health authority serving a 600,000 population in a developing country. This was the only service in the region providing specialized assessment for children with developmental concerns. In 2011 fifty percent of referrals were for developmental concerns and by 2019 this increased to 90%. The percentage of children seen for ASD annually within the clinics ranged from 25% to 41%.

Objectives:

We sought to determine the ages at first diagnosis for children with ASD and the proportions of children with comorbidities including Attention Deficit Hyperactivity Disorder (ADHD), Learning Difficulty (LD), Global Developmental Delay (GDD), Speech Difficulty, Feeding problems, Obesity, Epilepsy and Sleep onset delay.

Methods:

A Database on Microsoft Excel regarding patients with Autism Spectrum Disorder attending the community pediatric clinics at the health authority was reviewed for the period Sept 2018 to August 2019. The data was analyzed using Microsoft excel spreadsheet.

Results:

The numbers of children seen for ASD steadily increased from 2012 to 2019. 178 children were seen in 2012 and 724 in 2019. The odds of being diagnosed ASD in 2019 was significantly higher compared to 2012 (OR 1.8; 95% CI 1.5-2.1; P < 0.0001).

From September 2018 to August 2019, 83 new patients (71 Male), were diagnosed with ASD. 21(25%) age 2-3yrs, 23(28%) age 3-4yrs, 12 (14%) age 4-5yrs, 22 (27%) age 5-12yrs and 5 (6%) age more than 12yrs. 53% had first diagnosis before the age of 4yrs (median age 46 months). The average age of diagnosis was 62 months. 641 (513 M) had a previous diagnosis of ASD; 507(79%) were more than 5yrs.

Co-morbidities

From September 2018 to August 2019, 114 (15.7%) children with ASD were diagnosed ADHD (98% were more than 5yrs of age). In the more than 5 yrs category 21% were diagnosed with ADHD. 197 (27%) had LD. 122 (16.9%) had GDD. 396 (54%) had speech difficulty. 53 (7.3%) had feeding problems. 24 (3.3%) had epilepsy. 68 (9.4%) were obese or overweight (96% were more than 5yrs). 30 (4.1%) had sleep onset delay.

Conclusions:

Using an approximate 0-19 population of 168,000 for the health authority and an estimated worldwide prevalence of 1% for ASD, approximately 1,680 patients were expected to have ASD. 724 children were seen during 2018 to 2019 which is less than 50% of the expected numbers. It is likely that ASD is still under diagnosed and a prevalence study is needed.

47% had a diagnosis after the age of four years. The average age for first diagnosis was 62 months. A large percentage of children are not being detected between the ages of 2-4 yrs. A national screening program needs to be considered.

In the more than 5 yrs category 21% were diagnosed with ADHD. This is lower compared to international data. Children may need to be more actively assessed for ADHD.
The proportions of children with other co-morbidities were lower compared to international data. A local prevalence study regarding ASD and its comorbidities is required.


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Background: Autism spectrum disorder (ASD) is associated with higher rates of comorbidities and healthcare utilization compared with children of typical neurodevelopment. Disparities by sex and age have been described in the literature before, though findings from cohort and registry studies are at times discordant.

Objectives: To describe the prevalence of ASD, mental health comorbidities, healthcare utilization, and caregiver wellness among children with ASD compared with children with and without other special healthcare needs (SHCN). We also describe differences within the ASD population by age and sex, and before/after the COVID-19 pandemic.

Methods: The National Survey of Children’s Health (NSCH) is a nationally representative survey, the methodology of which is published and publicly available (www.childhealthdata.org). Data includes caregiver report of current ASD along with other SHCN. We analyzed data from 2016-2021 and used multiple logistic regression to test for trends over survey year. We provide point estimates of prevalence and 95% confidence intervals (CI). All analyses accounted for the complex survey design and were conducted using Stata IC/15.1.

Results:

The final sample (n=191,382) represented a population of 60.7 million children ages 3-17 years. The pooled prevalence of ASD was 2.85%, representing 1.7m children. Prevalence per year varied from 2.4% to 3.1%, and there was no significant trend over time (p=0.198). Compared to both children with and without other SHCN, children with ASD were less likely to have excellent/very good general or dental health, along with numerous other comorbidities (Table 1).

The proportions with ASD receiving behavioral treatment or medication over the past 12 months were 58.5% and 25.6%, respectively. There were no significant differences by sex (Table 2). Fewer children ages 11-17y received behavioral therapy and more received medication.

ASD was associated with more mental health services use, unmet need, and frustration in obtaining care compared with those both with and without other SHCN. Among caregivers of those with ASD, 51.5% (48.3 - 54.7%) report sometimes, usually, or always being frustrated with obtaining care, compared with 34.4% (33.3 - 35.4%) among caregivers of other children with SHCN and 12.8% (12.4 - 13.3%) of caregivers of children without SHCN. Children with ASD and other children with SHCN were more likely to have visited an emergency room or needed referrals within the past year.

Caregiver wellbeing and stressors of care were generally worse among those with ASD, with 13.9% reporting their child was “always” harder to care for, compared with 3.9% among other children with SHCN and 0.34% among children without SHCN. Frustration in access to care was associated with worse caregiver wellness. There were no significant differences in caregiver stress by child’s sex or between time periods prior to and during the COVID-19 pandemic.

Conclusions: ASD is associated with high care utilization and unmet need, and inadequate access to care is associated with caregiver stress. High pre-pandemic need did not increase from 2016-2019 to 2020-2021.

**406.344 (Poster) Autism, Ageing, and Social Care**

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Background: For autistic people, the ageing process may be challenging as their health and social care needs change with age. These changes are likely to intersect with autism-related support needs such as anxiety and difficulties with change and uncertainty, difficulties with executive function, autobiographical memory, and the ability to think about the future \(^{11}\). Autistic community-led ageing priorities identified via scoping sessions, focus groups and literature reviews\(^{12}\) indicate that support needs should include focus on health and wellbeing in ageing; people’s understanding of the ageing process; service planning; relationships and social inclusion; and legal and financial advocacy.
Objectives: To identify the areas of priority and gaps in social care support for older autistic people, identify what healthy ageing looks like for older autistic people, and provide recommendations for social care workers regarding how autistic people may be better supported to thrive as they age.

Methods: We conducted 3 rounds of interviews with autistic people and social care providers (a total of 33 interviews), the first identified priorities, gaps and good practice in social care support, the second focused on healthy ageing, and the third on provision of care within the home. Autistic people aged 50+ were recruited via a range of community organisations and networks, social media, and word of mouth. Social care providers were recruited through organisations, charities, councils, and social media. Ethical approval was granted by the University Ethics committee. Informed consent was gained from all participants before taking part. All interviews were conducted online (due to COVID restrictions), either via text, with video and voice, or just voice depending on participant preference. Interview data are being analysed by reflective thematic analysis (to be completed 01/23)

Results: Early themes are emerging, for instance, participants have raised themes as priorities such as: interaction with the healthcare; Healthy Ageing, Residential Care, and Lifelong Planning; and Training of Professionals. Autistic people reported a lack of understanding and knowledge among professionals relating to how best to work with them as they age. Autistic people reported a sense of fatigue that they have to continually train others in how to work with them. Autistic people reported the disabling effect of an impairment approach and the lack of use of a strengths-based approach and how that influenced engagement. Social care providers reported the need for specialised training in working with intersecting needs.

Conclusions: Older autistic people are not receiving the support they require to thrive. It is important that professionals are adequately trained to both work with autistic people and in working with age-related changes. The medical model can be disabling and othering (make autistic people feel different), it is important that a strengths-based approach is embedded in care.

1 Boulter JADD. 2014;44:1391-402;
3 Lind J Abnorm Psychol. 2010;119:896-905;
5 Crompton Autism Adulthood.202;.121-127;
6 Braun 2021 Thematic Analysis Sage

406.345 (Poster) Barriers and Facilitators to Early Intervention Services: A Study of How Caregivers Access Part C State Systems
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Background: The US Individuals with Disabilities Education Act (IDEA) of 1975 established Part C, a mandate for the provision of free, state-administered Early Intervention services for developmentally delayed children aged 0-3. Although autism is not a federally mandated Part C eligibility criterion, more toddlers with autism enter Part C each year. It is unclear how caregivers find and access Part C services for their child in each state, what barriers and facilitators there are to caregivers’ access to Part C information and services, or whether the accessibility of services predict their use. Given the heterogeneity of these systems from state to state, it’s important to consider how states approach the accessibility of Part C services to families of diverse backgrounds.

Objectives:

- To define and measure accessibility metrics of all 50 publicly available Part C state websites.
- To determine whether accessibility and mention of autism varies by state.
- To correlate accessibility with state-by-state Part C service use.

Methods: All data was generated from publicly available state Part C websites and the 2019 federal Office of Special Education Programs (OSEP) Annual Report to Congress. Four constructs measuring accessibility were operationalized and analyzed from Part C websites for all 50 U.S. states: languages offered; information availability and ease of access; convenience of methods for child referral; and website visual appeal and readability. The percentage of children under 3 enrolled in Part C services for each state was extracted from the OSEP report.

Results:
On average, 3% of children under three are enrolled in each state’s Part C system (SD=1.7%), with little variability by population size of state (Figure 1). 48% (N=24) of states included autism or social communication delays in their eligibility criteria. Most state websites (60%; N=30) had translation tools available for more than one language. Several states (78%; N=39) had information on child referral available in one click or less from the Part C home page, and several states (76%; N=38) allow any concerned adult to refer to Part C services. However, the method by which a child can be referred varied across states. Most states did not have online referral forms available (60%; N=30). Lastly, every website was given a visual appeal and readability rating of 1-5 by two independent raters; on average, ratings were moderate to low (M=2.7) and normally distributed with notable variability (SD=1.05).

Correlations between accessibility measures were weak-moderate in size, ranging from r=-0.3 to r=0.36 (Figure 2). Correlation analyses yielded no statistically significant relation between website accessibility and the 2019 state-by-state enrollment of children in Part C services (p’s > 0.05).

Conclusions: While state Part C websites do show promising accessibility (language access, universal referral), there is room for improvement (lack of online referral; website readability; whether autistic children are served). Information accessibility does not appear to affect rate of enrollment, although more recent OSEP data is needed. Future work will create a novel, comprehensive accessibility construct for early intervention government services. Further work will provide insight into diverse caregiver perspectives on how they approach seeking early intervention services for their developmentally delayed and/or autistic children.

406.346 (Poster) Barriers/Enablers for ASD Children for Vision Evaluation Review (BEAVER)

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Background: Children with Autism Spectrum Disorder (ASD) are at increased risk for vision and ocular health problems including significant refractive error (particularly astigmatism), strabismus, amblyopia, anisometropia and optic neuropathy. Though at increased risk, ASD children are less likely to complete vision screenings at their pediatrician’s office or school and are less likely to receive comprehensive vision examinations.

Objectives: This review investigates barriers and enablers for vision screenings and vision examinations for ASD children and categorizes those identified by previously defined themes including: challenges associated with autism-related characteristics, challenges experienced by vision care providers, challenges related to the health care system, and challenges experienced by the family, caregiver or household.

Methods: A pre-registered systematic review was conducted (CRD42022344299). Ovid MEDLINE, EMBASE.COM, Web of Science Core Collection (select indexes), ProQuest PsycINFO, ProQuest Dissertations and Theses Global, Cochrane CENTRAL (EBSCO) and CINAHL were searched. In addition, a handsearch of past International Society for Autism Research meeting abstracts was completed. Using the Rayyan platform, titles and abstracts were screened against eligibility criteria. Included were research studies (quantitative or qualitative) in English, published from 1994 or later (correlating with DSM-IV criteria), investigating vision screening or vision examinations in ASD children (<18 years) with a primary population of ASD children, their families or caregivers, vision screening personnel or eye care providers, or support staff or organizations for ASD children. Excluded were literature reviews, systematic reviews, case reports and case series and publications published earlier than 1994. Studies were also excluded if their focus was not specific to children with autism or if it was not possible to extract data pertaining to autistic participants.

Results: 2452 unique publications were identified through the database searches. The handsearch of past International Society for Autism Research meeting abstracts identified 3 more abstracts. Screening of titles and abstracts was completed for 2455 publications. Full text publications were reviewed for 233 articles. Forty-six publications were included; 32 of these focused on visual diagnostic or screening results, 7 investigated challenges associated with autism-related characteristics, 4 investigated eye care provider/vision screener-based issues, and 5 investigated challenges related to organizational issues including those within the health care system. Underway, included articles will be appraised using the Mixed Methods Appraisal Tool (MMAT). Data, from included studies, will be used to construct a data matrix. From the data matrix and MMAT results, a narrative synthesis will be constructed to identify patterns of consistency and divergence.

Conclusions: Barriers and enablers for vision care access for children with autism are present and occur at the patient, provider, family/caregiver and systematic levels. There is a dearth of investigations targeting issues experienced by eye care providers and vision screeners or issues experienced by family, caregiver, or households of ASD children.

406.347 (Poster) Battling the Bottleneck for Autism Spectrum Disorder Diagnosis and Care: Training a Primary Care Community Sample

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Background: Primary Care Practitioners (PCPs) in the US widely do not diagnose ASD (Martinez et al., 2018) and report being uncomfortable with assessing ASD risk (Carbone et al., 2013). Instead, they often refer families to scarce ASD specialty clinics with long waiting lists. This results in delayed identification and access to supports and intervention. Minority children, and children who live in underserved areas, are even more affected, receiving diagnoses less frequently, and years later, than their suburban, white counterparts (Angell et al., 2018; Constantino et al., 2020; Dababnah et al., 2018). Efforts to train PCPs in streamlined ASD diagnosis within Primary Care (PC) are growing (Ahlers et al., 2019; Hine et al., 2018, 2020), but these training programs are not currently widely implemented.

Objectives: The study aimed to replicate the initial findings of Hine and colleagues, via training a novel group of PCPs in streamlined ASD diagnosis of “uncomplicated” (i.e., high screening scores and low comorbidities) toddlers, and extend prior work by including a cohort of Family Navigators (FNs) being trained in ASD co-care coordination, while examining impacts of the training and learning community on knowledge, attitudes, and PC ASD practices.

Methods: PCP (n=9) and FN trainees (n=7) were recruited from a mid-sized midwestern US city and consented utilizing an Internal Review Board-approved protocol. See Table 1 for demographics. PCP and FN trainee participants completed online demographics and an adapted version of the Practice Behavior Questionnaire (PBQ: Hine et al., 2021) pre and immediately post STAT™ (Screening Tool for Autism in Toddlers & Young Children) initial training sessions, and 6 and 12 months later. The adapted PBQ assessed: knowledge of screening/diagnosis of ASD, current practice/intention to diagnose ASD, attitudes on appropriateness of ASD diagnosis in PC, and comfort level with ASD. After STAT™ training, PCPs and FNs participated in a year-long ASD learning community, moderated by an interdisciplinary research/community implementation team. Monthly meetings consisted of education on ASD topics and case consultation.

Results: Data presented here refers to pre and immediately post STAT™ training: additional longitudinal results will be added as available. From pre to post, trainee’s attitudes shifted to rating in-house ASD diagnosis as more appropriate, \( t(8) = -2.27, p = .05 \), Cohen’s \( d = 1.32 \); to feeling more comfortable identifying ASD characteristics, \( t(8) = -2.27, p = .05 \), Cohen’s \( d = 1.32 \); and to being more comfortable having the diagnosis discussion with families, \( t(8) = -5.38, p < .001 \), Cohen’s \( d = 1.05 \). PCP trainees were more likely to endorse attempting an in-house diagnosis vs. referring a patient to a specialist after STAT™ training [Likelihood ratio(1) = 3.86, \( p = .05 \); 40% likely to attempt in-house diagnosis at pre compared to 100% likely at post].

Conclusions: ASD diagnostic and care coordination training improved ASD attitudes, knowledge, and intentions to diagnose/serve families in PC. Examination of longitudinal data from these participants will gauge number of families served and screening to diagnosis lag times. ASD diagnosis and care within PC has potential for improving and streamlining diagnostic flows, especially for marginalized populations who experience inequities in access to ASD care.

406.348 (Poster) Behaviour Therapists’ Confidence, Knowledge, Attitudes, and Practice Experiences with Autistic Youth with and without Mental Health Challenges

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Background: Behaviour therapists (BTs) play a critical role in supporting the communicative, cognitive, and behavioural needs of autistic children and youth. Although many therapists may not specialize in mental health, they will often encounter autistic clients with mental health challenges in their practice and must take this added experience into account. Little is known, however, about the practice experiences of BTs in supporting autistic clients with mental health challenges.

Objectives: In partnership with Children’s Mental Health Ontario, this study aimed to understand the experiences, perceptions, and training needs of BTs providing services to autistic clients who also present with mental health problems.

Methods: Two-hundred and forty-one Ontario BTs (\( M_{\text{age}} = 35.1; 94.2\% \text{ cis-female}; 80.1\% \text{ White}; 46.4\% \text{ with 10+ years of experience}) completed an anonymous online survey. Participants reported on the proportion of autistic clients with mental health problems on their current caseloads, the proportion with severe/intensive needs, and the most common mental health problems encountered. Participants also completed a single item assessing their confidence in delivering their services (5-point Likert scale; Maddox et al., 2019), a 6-item self-rated knowledge measure related to autism and mental health (5-point Likert scale; Brookman-Frazee et al. 2012; Maddox et al., 2019), three items assessing their organizational resource needs (Zerbo et al., 2015), and five standard semantic differential scales (10-point slider scale; Fishbein & Ajzen, 2010) to assess their attitudes towards delivering their services to autistic clients with and without mental health needs.

Results: On average, BTs reported that autistic clients with mental health problems make up 33.3% (\( SD = 27.1 \)) of their current caseloads and that 42.5% (\( SD = 33.1 \)) of clients with mental health problems have severe/intensive needs. The three most common mental health problems encountered by BTs included anxiety (endorsed by 89.2% of providers), challenging behaviours (88.8%), and obsessive-compulsive and related disorders (51.5%). Wilcoxon signed-ranks tests indicated that therapists’ confidence was lower, \( Z = -12.7, p < .001 \), and organizational resources and support were less adequate, \( p’ s < .001 \), for clients with mental health problems compared to those without.
Similarly, while attitudes were generally positive regarding supporting clients with and without mental health challenges, paired-samples t-tests showed that therapists’ overall attitudes were more positive, \( t(234) = 14.6, p < .001 \), and their knowledge was greater, \( t(240) = 27.2, p < .001 \), for autistic clients without mental health problems compared to autistic clients with mental health problems. Therapists’ confidence, knowledge, and attitudes were all positively correlated among both client groups, \( p’s < .01 \).

Conclusions: Autistic clients with mental health problems make up a considerable proportion of BTs’ caseloads; however, many therapists do not feel as confident or equipped as they do when supporting clients without mental health challenges. Findings suggest a need for targeted training to build BTs’ capacity to support clients who also present with mental health challenges, especially in ways that can address reported gaps in knowledge and confidence.

406.349 (Poster) Building and Sustaining a Neurodevelopmental Disabilities Clinical Translational Core: A Riley Hospital for Children Division of Developmental Medicine Initiative

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Background: While research has advanced our knowledge of and methodologies for evidence-based early diagnosis and intervention for children with autism spectrum disorder (ASD) and neurodevelopmental disabilities (NDDs), this progress has not translated into community clinical practice where the majority of children with NDDs receive services. Further, within the NDD population, there are unique recruitment barriers in comparison to those without disabilities. To address the research-to-practice gap in the field of NDDs, many clinics across the nation, including Riley Hospital for Children, are developing and successfully implementing interdisciplinary clinical core programs that integrate clinical practice with research in addition to building research registries to better advance the field in NDDs.

Objectives: The present study describes our division’s initiative to build a clinical research database and research registry, including current progress, how we shifted our clinic practices to sustain the database, lessons learned, and future directions.

Methods: We developed a clinical research database and research registry utilizing REDCap in an outpatient NDD assessment and treatment clinic for children up through age 18. We worked closely with our IRB to navigate appropriate consenting, including the development of an abbreviated consent form. Prior to all psychology testing appointments, caregivers were emailed a link to complete the online consent form and a standardized intake from to collect background information. Upon the patients completing their clinical visits, providers were emailed a link to upload their evaluation data and diagnoses into REDCap.

Results: We began building the clinical database and research registry in August of 2021. We officially launched the database and registry in May of 2022 for all our psychology evaluation patients. Since our launch, we have collected psychology evaluation data, including cognitive, adaptive, behavioral, and autism-specific measures on 390 patients (71.79% males) between the ages of 1 and 17 years (\( M=5.60, SD=3.45 \)) across our 9 clinical psychologists. The sample included 70.35% White, 15.70% African American/Black, 1.74% Asian, 0.58% American Indiana/Alaskan Native, and 8.14% patients reporting more than one race, with 3.49% of patients choosing not to provide an answer and 6.43% reporting Hispanic ethnicity. Primary diagnoses provided included ASD (53.8%), global developmental delay (17.7%), Other (8.7%), ADHD (5.9%), Intellectual Disability (5.9%), mixed receptive-expressive language disorder (4.1%), anxiety (2.1%), specific learning disability (0.5%), unspecified behavioral disorder (0.5%), no diagnosis (0.5%), and depression (0.3%). Our research registry and database has also received high support from caregivers with 78.2% of patients agreeing to be in the research registry and 82.5% agreeing to have their data included in the clinical database. Updated data and tips for success will be provided at the time of presentation.

Conclusions: Overall, this project has been the first step toward integrating our clinical and research activities to help address the much-needed research-to-practice gap within the field of NDDs. We plan to expand our database to include all clinical service lines offered, including speech, pediatrics, and genetics. We have already modified clinical practices to better serve our patients based on results collected to date and to achieve sustainability with limited funding sources.

406.350 (Poster) COVID-19 Mitigation and Infection Among Children with and without Autism (Ages 5-9 Years) Enrolled in the Study to Explore Early Development Phase 3 (SEED 3), COVID-19 Impact Assessment

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Background: Children with autism spectrum disorder (ASD) or other developmental disabilities (DDs) may be at increased risk for negative outcomes related to COVID-19, in part because of greater healthcare needs that can impact consistent adherence to CDC-recommended COVID-19 mitigation strategies. Children with ASD also may have enhanced difficulty adhering to COVID-19 mitigation efforts due to behavioral, developmental, and sensory differences.
Objectives: The objective of this analysis is to identify and compare barriers for engagement in COVID-19 mitigation strategies, receipt of COVID-19 testing, and COVID-19 infection among three groups of children from the Study to Explore Early Development Phase 3 (SEED3), COVID-19 Impact Assessment: children with ASD, other DDs, and from the general population (POP).

Methods: Caregivers of SEED3 participants (aged 5-9 years) previously classified as ASD, DD, or POP completed a survey between January and June 2021 assessing impacts of COVID-19 during March-December of 2020. Caregivers reported on their child’s difficulty with four specific COVID-19 mitigation strategies (mask wearing, handwashing, physical distancing, and COVID-19 test swabbing), whether they had been tested for COVID-19, and whether their test was positive. Caregivers also completed the Vineland Adaptive Behavior Scales—Third Edition Parent/Caregiver Form (VABS-3) and the Child Behavior Checklist (CBCL) for the study child. Differences in difficulty with mitigation strategies and COVID-19 infection across the three study groups were examined using chi-square tests and logistic regression models, adjusting for child’s race, sex, socioeconomic status, VABS-3 domain scores, and CBCL subscale scores.

Results: In total, 1,027 caregivers completed the COVID-19 Impact Survey (ASD=274, DD=368, POP=385). A greater proportion of ASD versus DD and POP caregivers endorsed that their child experienced difficulties with all four mitigation strategies. Despite similar proportions of study children receiving a COVID-19 test across the three groups (36%-39%), the positivity rates for ASD and DD children were 3 times higher (11% and 13% respectively) than for POP children (4%).

In multivariable logistic regression models, caregivers who endorsed masking difficulty for their child, versus those who did not, had greater odds of being from the ASD than the POP group (adjusted prevalence odds ratio [aPOR]=1.95, 95% confidence intervals [CI] 1.21–3.14). Similarly, caregivers who endorsed physical distancing difficulty for their child, versus those who did not, had greater odds of being from the ASD (aPOR=1.79, 95%CI 1.13–2.84) and DD (aPOR=1.46, 95%CI 1.06–2.01) than the POP group. Study group did not remain a significant predictor in the adjusted hand-washing and nasal swab models.

Conclusions: During the early months of the COVID-19 pandemic, children in the SEED3 ASD and DD groups experienced more difficulty with COVID-19 mitigation activities and had higher COVID-19 positivity rates than general population controls. Children in the ASD group were especially prone to difficulties with masking and physical distancing. These findings highlight additional challenges faced by children with DDs, particularly ASD, and their families during a pandemic that potentially increase their risk for negative health outcomes. Public health measures must consider barriers to mitigation for individuals with disabilities.

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Background: Parents with early developmental concerns face many barriers when seeking early autism evaluations including long waitlists, provider shortages, and inequities in access to care. Telehealth-based services have the potential to improve families’ support during this pre-diagnostic period, but a key barrier is the lack of validated tools for identifying infants at elevated likelihood of autism in community settings. We have previously demonstrated the feasibility and acceptability of the TEDI, a developmentally-focused telehealth-based assessment for infants ages 6-18 months, in a sample of infants with early developmental concerns (Talbott et al., 2019, 2021). The current study extends this work by examining the rates of autism and other non-typical outcomes in toddlerhood.

Objectives: To conduct longitudinal follow-up assessments of infants with early developmental concerns via telehealth to examine rates of autism and other clinical concerns in toddlerhood.

Methods: Participants included 54 infants (27 female) aged 6-12 months who enrolled in a pilot (n = 11) or subsequent feasibility (n = 43) study developing and testing the TEDI and who participated in at least one TEDI session as infants (M= 10 months). Families lived across more than 20 states, and identified as 79% White, and 9% Hispanic or Latino. Measures completed in the TEDI included the Autism Observation Scale for Infants (AOSI;Bryson et al., 2008) and the ESDM Infant-Toddler Curriculum Checklist (IT-CC; Rogers et al., 2020): Beginning at 30 months, families were asked to participate in a follow-up toddler visit, consisting of a telehealth evaluation using the Tele-ASD-Peds (TAP; Corona et al., 2020, pilot participants) or the TAP and Toddler Autism Symptom Inventory Interview (TASI; Coulter et al., 2021; feasibility study participants). Outcome visits were conducted by Ph.D.-level developmental or clinical psychologists with extensive experience in early identification and diagnosis of autism. These psychologists were naïve to earlier TEDI assessments. Clinical best estimate outcomes included DSM-5 criteria for autism, typical development, or other clinical concerns noted but not formally evaluated (speech-language, ADHD, etc.).

Results: To date, 23 toddlers have completed an outcome visit (15 female, M = 33 months, range 27-38 months). Overall clinical best estimate rates by category were as follows: autism = 7 (30%) other concern = 7 (30%), typical development = 9 (40%). A one-way ANOVA indicated toddlers with autism and other concern outcomes tended to have higher AOSI and lower developmental curriculum
scores at TEDI intake visits compared to toddlers with typical outcomes; AOSI: F(1, 21) = 4.408, p = .048; Curriculum: F(1, 15) = 3.336, p = .088.

Conclusions: In this preliminary study, we found that infants with developmental concerns in the first year of life have high rates of autism and other clinical concerns in toddlerhood. These findings will be strengthened by ongoing and future work with larger samples of infants examining specific predictors of developmental trajectories and outcomes within this population. However, these initial findings suggest that telehealth evaluations of infants’ early development may be one route towards increasing the accessibility of early evaluations for parents with concerns in the first year of life.

406.352 (Poster) Changes in Autistic Adults’ Healthcare Independence during the First Year of Adult Primary Care at a Patient-Centered Specialized Autism Clinic
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Background: Transitioning from pediatric to adult healthcare is challenging for many autistic individuals due to various interpersonal and systemic barriers. One barrier is that autistic adults tend to need more support with healthcare tasks, like talking to providers or scheduling appointments, than the general population. The Center for Autism Services and Transition (CAST) is a patient-centered primary care clinic aiming to minimize barriers to care for autistic adults. For example, CAST patients are seen by physicians with extensive experience working with autistic adults and may receive modifications to the standard patient workflow (e.g., bypass the waiting room due to sensory sensitivity). Prior work found CAST patients have greater satisfaction with care, continuity of care, and receipt of preventive services than national samples of autistic adults. In this study, we sought to examine whether CAST patients demonstrate increased healthcare independence over time.

Objectives: To quantify healthcare independence among autistic adults during their first year of receiving care through CAST.

Methods: We conducted a prospective longitudinal study. Participants included 27 autistic adults who are their own legal guardian and participated via self-report and 21 family members of autistic adults with a legal guardian who provided proxy-reports. Online surveys were administered upon establishing care at CAST, 6 months later, and 12 months later. Our primary outcome was healthcare independence, measured by the Transition Readiness Assessment Questionnaire total score, which ranges from 1 to 5 where higher scores indicate more healthcare independence. We used generalized linear mixed modeling to examine changes in healthcare independence over time while controlling for baseline: (1) demographic characteristics (i.e., gender, education, age, race); (2) restrictive and repetitive behaviors, measured by the Adult Repetitive Behavior Questionnaire-2A and Repetitive Behavior Scale–Revised; and (3) executive functioning, measured by the Behavior-Rating Inventory of Executive Function–Adult.

Results: Table 1 provides participant characteristics. Autistic adults who participated via self-report tended to have higher baseline healthcare independence (Mean=3.2, SD=0.7) than those whose family members completed the survey (Mean=1.5, SD=0.6). Among autistic adults who participated via self-report, healthcare independence increased significantly from baseline to 12 months (Mean improvement=0.4, 95% CI=0.2-0.6) and from 6 months to 12 months (Mean improvement=0.3, 95% CI=0.1-0.5; Figure 1). Among autistic adults whose family members completed the survey, no significant changes in healthcare independence were observed over time.

Conclusions: Our results, while preliminary, found autistic adults self-reported increased healthcare independence over time while receiving care through CAST, adding to literature demonstrating the effectiveness of patient-centered healthcare for autistic adults. Further work is needed to understand the most significant drivers of increased healthcare independence among autistic adults who are their own legal guardians and identify targeted strategies that may better assist autistic adults with legal guardians, who likely have higher support needs, in increasing their healthcare independence over time.

406.353 (Poster) Changes in Health and Education Services during COVID-19 Among Children Ages 5–9 Years By Disability Status
Background: Physical distancing and lockdown measures during the COVID-19 pandemic were widely associated with loss of health and education services. Effects may have been more pronounced for children with autism spectrum disorder (ASD) due to their increased need for services for co-occurring conditions, reliance on specialty services in both clinic settings and school-based programs, and difficulties using telehealth and remote learning.

Objectives: To assess differences between children with ASD, other developmental disabilities (DDs) and population controls (POP) in 1) disruptions to regular healthcare and specialty services and reasons for difficulties accessing services, and 2) disruptions to school services and supports for remote learning.

Methods: Caregivers of children ages 5–9 years (N=1,027) from six U.S. communities completed a survey during January–June 2021 to assess COVID-19 impacts during March–December 2020. Children were previously classified as having ASD or another DD using standardized diagnostic measures. Caregivers were asked about delays in regular healthcare or specialty services, reasons for difficulties obtaining services, school closures, disruptions to school-based plans and accommodations, and resources for remote learning. Differences were assessed with chi-square tests and modified Poisson regression adjusting for key demographic and socioeconomic variables.

Results: Disruptions to regular healthcare services were common across all groups (58.4%–65.2%). Among children receiving specialty services, disruptions were somewhat more likely for ASD versus DD children and over three times more likely for ASD versus POP children.

The most common reasons for difficulty obtaining services were clinic closures and avoiding COVID-19 transmission, both of which were somewhat more common for ASD versus DD and POP children. ASD children also were somewhat more likely than DD children and 2.5 more times likely than POP children to have difficulties with telehealth; ASD children were 2.5 times more likely than DD children and 6.5 times more likely than POP children to have difficulty wearing a mask.

Across all groups, school closures were common during March–May (88.4%-93.0%) and October–December (71.5%-82.5%). Schools commonly offered live online classes and provided printed and online assignments. Across groups, 76.7% of children always had access to a computer or digital device; this proportion was higher when devices were made available by schools (85.1% vs 70.5%, p<0.001; data not shown).

Children with ASD received online classes less often than children with other DDs (84.3% versus 91.1%, p=0.013). While similar proportions of ASD and DD children had decreased ability to receive school-based accommodations, ASD versus DD children were more likely to have disruptions to special educational plans (50.0% versus 36.2%, p<0.009).

Conclusions: Disruptions to health and education services were common for all children but were more pronounced for children with ASD. Children with ASD were more likely than DD/POP children to have disruptions to specialty services and difficulties with telehealth and mask wearing; in school they were less likely than DD children to be offered online classes and more likely to have disruptions in special education plans. These findings highlight the need to plan for continuity of care for children with ASD during public health emergencies.
Caregivers of children and adolescents with ASD between 19 months and 18 years completed an online survey inquiring about the impact of the COVID-19 pandemic on access to services and their satisfaction with the service delivery formats used (remote, in-person or hybrid) for various services (special education, speech, occupational/physical therapies, ABA, mental health, and medical).

Results:

Preliminary analysis of data from the 4 timepoints across 2020 and 2021 revealed that ASD services had not recovered to a fully in-person format by July 2021 for all service types. Certain service types, namely, special education, ABA, speech therapy, and PT/OT had recovered to in-person formats to a greater extent (% recovery of in-person services=24-46.3%) compared to mental health or medical services (% recovery of in-person services = 15-20%). This was also associated with an increase in parental report of satisfaction with therapeutic services (SLT, PT/OT % improvement in satisfaction = 7.1-7.3%) showing slightly greater improvements compared to mental health and medical services (MH and MED % improvement in satisfaction = 4.6-5.7%). However, the extent of recovery to in-person services (15-46.3%) did not correspond with the increase in parental satisfaction over time (4.6-7.3%).

Conclusions:

In conclusion, in-person format of service delivery increased in the one year after the pandemic; however, full recovery to in-person services was not seen. Parent’s satisfaction with services also varied as a function of service type and delivery format. Further relationships/interactions between service types, delivery formats, parental satisfaction with services, as well as child outcomes will be explored in the final presentation. In conclusion, healthcare services for children with ASD were evolving rapidly during the course of the pandemic and that was associated with parent’s satisfaction with the services received as well as changes in child’s development/ASD symptoms. These findings have important implications for how service delivery formats need to be suited to the type of services offered and directly influence parent’s overall satisfaction about service quality.

406.355 (Poster) Childhood Predictors of Emergency Department Utilization in Adolescents with Developmental Disabilities

Background: Individuals with autism, intellectual disability, and other developmental disabilities visit the ED at a high rate during adolescence compared to typically developing individuals. Frequent utilization of the ED can be an ineffective and inefficient intervention for low acuity, chronic conditions, and behavioral difficulties for families trying to access care for their youth with developmental disabilities. Despite the frequent utilization and recidivism, our knowledge of the late childhood risk factors for adolescent ED utilization is limited. Understanding the risk factors in early life that are related to high ED utilization may lead to the development of targeted interventions for families of children with developmental disabilities.

Objectives: The present study aimed to assess the relationship between biological and environmental factors in late childhood (ages 8-12) and the ED utilization rate during adolescence (ages 13-17) for individuals with autism and/or Intellectual Disability (ID) (n=1848).

Methods: This study utilized longitudinal administrative data from 2000-2015 to assess late childhood (8.0-12.11) factors that are associated with adolescent (13.0-17:11) ED visits among youth with developmental disabilities via generalized linear mixed models with covariate adjustments for gender/sex, IQ score, and qualified for free or reduced lunch at least 50% of the time in public school during ages 8.0-12:11 (as a proxy for socioeconomic status (SES)).

Results: Results showed that Non-Hispanic White individuals, and individuals with ID-only visited the ED more than Hispanic individuals, and individuals with autism. Females had significantly higher adolescent ED incidence rates compared to males irrespective of ID status; however there were no differences in rates between females with ID (+/- autism) vs. without ID (i.e. autism without ID), whereas males with ID +/- autism experienced more adolescent ED visits than males with autism without ID. Individuals with DSS reported maltreatment, psychopharmacological treatment, and low SES in late childhood experienced significantly higher rates of adolescent ED visits. Individuals who visited the ED, were admitted to inpatient hospitalization, and encountered or had direct treatment from DMH in late childhood experienced significantly more ED visits in adolescence as compared to their respective counterparts, regardless of gender/sex, IQ, and low SES.

Conclusions: Overall, individuals with developmental disabilities are at a heightened risk for ED utilization, but nuances exist within these populations that distinguish those with the most risk. Identifying children at highest risk for long-term ED reliance early in life and providing appropriate interventions for behavioral and mental health conditions may equip and empower families to handle difficulties without needing the ED services.
Background: Research indicates that children and youth in remote regions can struggle to receive appropriate mental health care, resulting in poorer outcomes over time (Heflinger et al., 2015; Ivey-Stephenson et al., 2017). These care disparities have been linked to three main types of barriers: the limited availability of services, the low acceptability of seeking mental health care, and the restricted accessibility of services in remote regions (Smalley et al., 2010). Many researchers have also highlighted the challenges encountered by autistic youth and their caregivers when seeking services in rural communities (Young et al., 2019), but little is known specifically regarding autistic clients with co-occurring mental health needs.

Objectives: To compare the knowledge, confidence, and experiences of mental health providers when treating autistic children and adolescents with mental health needs across three regions that vary in remoteness.

Methods: Publicly funded mental health providers (N = 611; M_age = 40.2 years; 83% cis-women; 80.3% White) from across Ontario completed an anonymous survey link assessing their knowledge, confidence, and experiences when treating autistic clients with mental health needs. The Statistics Canada Remoteness Index (RI; Alasia et al., 2017; Subedi et al., 2020) was used to categorize providers into three remoteness categories based on their agency locations: easily accessible (n = 449), accessible (n = 96), and remote (n = 63). Provider knowledge was measured using a 6-item self-reported scale (Brookman-Frazee et al., 2012; Maddox et al., 2019), while provider confidence was assessed using the Therapist Confidence Scale – Autism Spectrum Disorder (TCS-ASD; Cooper et al., 2018) and self-efficacy was measured using a single self-report item (Maddox et al., 2019). Providers were also asked to report on barriers to care and to rate their level of agreement with three statements about their organizations’ resource needs (i.e., provider, caregiver, and client supports; Zerbo et al., 2015). Mean confidence and knowledge ratings were compared across the three remoteness groups using one-way ANOVA’s, while self-efficacy and agreement ratings were compared using Kruskal-Wallis tests. Further, providers’ opened-end barrier responses were examined for group differences in the three barrier themes outlined by Smalley et al. (2010).

Results: No group differences were found in terms of providers’ confidence, knowledge, or self-efficacy; however, providers in the remote group were less likely than those in the accessible and easily accessible groups to agree that their clients’ caregivers have adequate support, H(2) = 7.11, p = .03. Providers from remote regions were also more likely to report barriers to care, χ(2, N = 608) = 46.37, p < .001, particularly in the terms of availability of services, compared to clinicians from more accessible regions.

Conclusions: These results support previous investigations highlighting the challenges experienced by remote caregivers and further underscore the need for additional resources and services in remote regions, particularly those that are tailored to autistic youth with co-occurring mental health needs. In turn, these findings have implications for policies and programs aimed at recruiting specialized health providers to these communities.

Background: The context of teacher education within a rapidly changing world generates challenging questions for teacher educators. With current legislation in England, Finland and Sweden supporting the principle of ‘inclusive education,’ it was surmised that all student teachers would work with pupils on the autism spectrum and therefore need to be prepared to include them in classes. However, it was recognised that perceptions of autism can be negative in the general public (Huw & Jones, 2010; Wood & Freeth, 2016), in media (Jones & Harwood, 2009; Pesonen et al., 2021), and in education (Humphrey & Lewis, 2008).

Objectives: Research (Mosyold & Ohnstad, 2016) has identified that teachers need to reflect on their use of language and consider the ethical implications of describing pupils using normative terms. With this research knowledge it was considered valid to examine the words (vocabulary) used by student teachers’ when asked to provide three words to describe their perceptions about people on the autism spectrum. It was anticipated findings could then be utilised to illustrate to teacher educators how to enhance initial teacher education to aid the advancement of inclusive education. This research also aimed to identify whether differences exist in student teachers’ perceptions towards autism across English, Finnish and Swedish contexts.

Methods: The sample comprised a total of 704 student teachers, with 191 in England, 251 in Finland and 262 studying in Sweden. All participating student teachers completed a survey which utilised a cross-sectional design about their perceptions and experiences of people (including pupils) on the autism spectrum. This presentation focuses on the positive words from the theme which recorded the highest number of responses when participants were asked to write down the first three words that came to mind when thinking about people with
autism. Analysis was carried out using a multi-layered, deductive co-rated coding approach to ensure adequate inter-rater reliability. The content analysis procedure was designed and actioned by the researchers from each of the three nations.

Results: Findings suggest that at least half of the positive words used by student teacher participants from England (52.29%) and Sweden (55.68%) do see positive social abilities and characteristics in people on the autism spectrum. However, when positive learning factors alone are scrutinized these figures fell with English student teachers only recording 13 (12.62%) positive words and Swedish student teachers, 60 (42.25%). In comparison, only 39.23% of words chosen by Finnish student teachers to describe positive social abilities and characteristics were positive, but 78.26% of words were focused on positive learning characteristics. It is therefore posited that cautious connections can be made between the words chosen by student teachers in each of the three nations regarding the positive personality / characteristics of people on the autism spectrum and the nations’ social and political status of teachers, school education and inclusion.

Conclusions: This study suggests that student teachers’ perceptions are influenced by the value and quality of their initial teacher education programmes, and by their nation’s policies of inclusion and the professional status teachers have within society.

406.358 (Poster) Delivering a Pre-Emptive Parent Mediated Intervention Program Online for Infants at High Likelihood for Autism in India – What Helps and What Stands in Our Way?

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Background: 40-50% of infant siblings of autistic children are at high familial likelihood (HLASD) to develop delays requiring early intervention. There is prior evidence supporting commencing intervention for these infants prior to formal diagnosis— preemptive intervention (Green et al., 2015). Though there is sizable work supporting online intervention for autistic children, this is the first study to provide preemptive parent-mediated intervention (PPMI) through an online modality— a model conceived during the peak of the COVID-19 pandemic. Understanding facilitators and barriers unique to lower middle-income countries (LMIC) like India catering to HLASD families is important to successfully conduct such a program on a larger scale.

Objectives: Understanding facilitators and barriers to delivering PPMI online for HLASD infants

Methods: Data from 14 parents of HLASD (infant age: 11±1.56 months, 10 Male) receiving intervention as part of a larger ongoing intervention study have been included. A PPMI based on naturalistic-developmental behavioral principles was developed and provided. The PPMI was conducted using video feedback and live demonstration with focus on social communication and language. The PPMI included 15 sessions across 12 weeks delivered through ‘Zoom’. The interventionist took detailed notes after each session. Key facilitators and barriers to PPMI delivered online were identified based on two broad themes emerging from analysis of session notes (n=149 sessions)– theme1: related to use of technology, theme2: related to scheduling sessions.

Results: Key facilitators (table-1) included (1) reimbursement of additional mobile internet recharge packs to attend sessions and transfer large files for video feedback, (2) providing culturally relevant illustrated guides for recording and sharing of videos, (3) accommodating late evening PPMI sessions (latest 10:30PM IST) to ensure (i) no disturbances to routines of both siblings (e.g., sleeping hours of the infant, intervention/school timings of autistic sibling) (ii) availability of both parents or availability of the parent who owns a smartphone supporting Zoom. Barriers included (1) fluctuating network (mobile or wi-fi) due to rains or limited high speed internet causing interruptions during sessions, (2) unavoidable interruptions from either/both siblings (e.g., requesting attention from the parent attending the session, waking up from naps early), (3) travel to hometown/villages during holidays, celebrations during festival season, family events like birthdays/weddings, or spontaneous/unscheduled visits from family members causing rescheduled/missed sessions, (4) health related concerns in siblings/parents (e.g., flu during monsoon) requiring rescheduling of sessions. See table-1 for frequency of occurrence of key barriers. Data collection is ongoing (projected at n=450 sessions by April 2023). Data analysis from feasibility forms and semi structured interviews with 6 families who have completed the PPMI demonstrate preliminary feasibility and acceptability of the PPMI.

Conclusions: Although preliminary, current analyses have offered systematic information on facilitators and barriers that are unique to the culture (e.g., festival season) and the population being catered to (nap time for the infant, routine of the older sibling). These nuanced aspects when incorporated will help tailor make programs that will have an impact on feasibility and acceptability and overall scalability of the current PPMI being researched for the first time in India.

406.359 (Poster) Delivering the Communicationdeall Early Intervention Online – Key Learnings through the Lens of Caregivers and Interventionists

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Background: The Communication DEALL (ComDEALL) Early Intervention program (Karanth et al., 2010) for autistic children is a child centered, in person, structured program offered at multiple centers across India. During COVID-19 lockdown, one of the ComDEALL affiliates, shifted to parent mediated tele-intervention (ComDEALL-PMTI). Globally, there is growing evidence for PMTIs (Parson et al., 2017). However, limited information is available about the caregivers and interventionists perspective on delivering intervention online from a low resource country like India.

Objectives: To gain insights into caregivers and interventionists perspectives on feasibility and acceptability of the ComDEALL-PMTI

Methods: 13 caregivers of autistic children aged between 3-7 years (4.9±1.75 years, 10Male) were recruited from the community between May 2019-October 2022. A multidisciplinary team including speech and occupational therapists, and special educator conducted assessments on ‘Zoom’ using the ComDEALL Developmental Checklist and Dunn’s Sensory Profile. Based on caregivers’ preference, intervention was delivered on WhatsApp, an app culturally more familiar and accessible compared to Zoom. A WhatsApp group was created with caregivers and their interventionists(n=3) to share intervention goals, training videos, training forms and materials from open access sources. One core and one follow up session was conducted each week. The first session explained goals/activities using video modelling (30 mins). The next focused on video feedback (15 mins). Interventionists left voice notes/typed messages for continued support. Feedback on feasibility and acceptability of ComDEALL-PMTI was collected via phone call interviews with caregivers and interventionists. Themes emerging from these interviews were analyzed.

Results: Themes from interviews included (1) modality and (2) method of delivering intervention. Under preferred modality of intervention: three caregivers dropped out of intervention due to personal reasons. Seven (62%) preferred online mode. Reasons included decrease in travel induced stress, more time for family activities, overcoming stigma related to autism. One preferred hybrid mode as they saw merit in both. Two (15%) preferred in person as they missed physical connect. Overtime, one preferred online and the other hybrid. All interventionists preferred hybrid mode. One interventionist found explaining some activities (e.g., sensory play) challenging. Interventionists expressed that one WhatsApp group facilitated interdisciplinary communication and prevented challenges from escalating but often blurred professional and personal times. Under method of intervention: all caregivers reported that video feedback helped understand and practice activities better. However, recording videos was challenging. Continued support through WhatsApp, sharing of materials was appreciated by caregivers. Interventionists reported home videos helped pinpoint areas that caregivers needed help. Understanding the home environment allowed intervention tailored to individual milieu to streamline schedules, ensure child’s access to visuals, incorporate activities into daily routines and use household materials for activities.

Conclusions: ComDEALL early intervention, being delivered online for the first time– the ComDEALL-PMTI, was found both feasible and acceptable by caregivers and interventionists. Although results are based on a small sample of caregivers, they hold promise for further use. If online modification is found efficacious (e.g., RCT design) and the model is used regularly, it will cater to a larger population who have less access to good quality intervention.

406.360 (Poster) Development of a Novel Telemedicine Tool to Reduce Disparities Related to the Identification of Preschool Children with Autism

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Background: The COVID-19 pandemic heralded a rapid transition to telemedicine, despite limited resources available to support tele-delivered autism assessment. Two years later, tele-assessment remains a viable, and often desirable, alternative to traditional models of care, with potential to reduce diagnostic delays that disproportionately affect traditionally underserved communities. To optimize use of tele-assessment, the field must commit to a planful, sustainable approach to creating and disseminating telemedicine tools and models. The field of implementation science can support this endeavor, by encouraging stakeholder-informed design and service models tailored to unique contextual factors influencing uptake.

Objectives: This presentation describes the stakeholder-informed co-design process leading to the creation of the TAP-Preschool (TAP-P), a telemedicine-based autism assessment tool for children 36-72 months. We present pilot data on use of the TAP-P, including diagnostic agreement, diagnostic certainty, and clinician and family satisfaction.

Methods: The creation of the TAP-P was informed by (1) application of machine learning models to a large clinical data set of preschoolers with ASD and other developmental concerns (n=914) and (2) focus group feedback on tele-assessment procedures and activities. Specifically, machine learning was used to generate behavioral targets that best distinguish ASD and non-ASD features in preschoolers. Focus groups questions informed by implementation science frameworks were used to identify barriers and facilitators to tele-assessment. Focus groups participants included experts in ASD assessment (n=8), providers from underserved communities (n=7), and parents of preschool children with ASD from traditionally underserved racial/ethnic and linguistic groups (n=9). Focus group themes and machine
learning analyses were used to generate an instrument with distinct assessment tasks and scoring procedures based on a child’s language level (i.e., TAP-P Verbal, TAP-P Non-verbal). The TAP-P was piloted with 29 families, with remote clinicians blind to diagnostic status coaching parents through activities in their homes. Clinicians assigned Likert scores across behavioral domains and rated diagnostic certainty and satisfaction with the TAP-P. Families provided satisfaction ratings.

Results: Participating children (mean age=49 months, range 37-68 months, 79% male) with existing diagnoses of ASD (n=20) or other developmental concerns (n=9) completed preliminary TAP-P procedures. Results indicate that use of the instrument in isolation (i.e., without history or collateral information) yielded accurate classification in 66% of cases. Children with ASD diagnoses received higher TAP-P scores, relative to children with other developmental concerns. Clinician diagnostic accuracy and certainty were higher when confirming existing ASD diagnoses (80% agreement) than when ruling out ASD in children with other developmental concerns (33% agreement). Clinicians universally voiced a need for parent report in addition to the assessment tasks. Future phases of this study will incorporate symptom-focused interviewing. Parents reported high levels of satisfaction with TAP-P procedures.

Conclusions: If successful, this work could help address existing barriers in access to diagnostic evaluations that underlie ongoing health disparities. Utilizing an equity approach to understand the functionality and impact of tele-assessment for preschool children has potential to transform the ASD evaluation process for traditionally underserved populations.

406.361 (Poster) Development of a Patient-Facing Mobile Health App to Track Family Access and Engagement with Early Intervention Services in Underserved Communities

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Background: Expedient access to early intervention (EI) systems has been identified as a priority for children with autism and other developmental differences. Despite the mandated availability of EI, it remains challenging for families to navigate referral processes and establish services. Such challenges disproportionately impact families from traditionally underserved communities (i.e., families in poverty, racial/ethnic minorities). Mobile health apps have the potential to improve clinical outcomes, increase accessibility to health services, and promote adherence to health-related interventions. Though promising, implementation of apps within routine care is in its infancy, with limited research examining the components of what makes an effective app or how to reach those families most impacted by inequities in healthcare delivery. The purpose of this project was to develop a patient-facing app to track family engagement in EI services through a co-design process involving stakeholder input, informed by the Consolidated Framework for Implementation Research (CFIR).

Objectives: This presentation will discuss the co-design process of a mobile health app, Family on Track (FOT). We will share findings from stakeholder focus groups regarding facilitators and barriers to use, and strategies for integration into routine clinical care.

Methods: Focus groups were comprised of 29 participants across four stakeholder groups, including family members, clinicians and clinic staff, community providers, and experts in diversity and inclusion. Stakeholders were presented with two computer-based versions of a survey to track family engagement with the Part C system, each of which had the potential to be translated into a future app. The two formats differed in the (1) their presentation and user interface, (2) the degree of survey customization, and (3) back-end processes for downloading and interpreting data. CFIR-informed interview questions elicited feedback about implementation within routine care, especially when targeting families from underserved groups. Qualitative coding was completed using a content analysis and predominately deductive approach. Using themes and insights identified via focus groups, we collaborated with the Department of Mechanical Engineering to develop the FOT app.

Results: Qualitative analysis from stakeholder focus groups highlighted a collective desire for increased communication and information about the process of accessing EI services, the ubiquity and potential utility of a mobile app for communication, and recommendations for app features. These themes informed the development of the FOT app and related implementation supports. App features included survey customization based on prior responses, timing and delivery of prompts, and questions related to barriers and service satisfaction. Implementation supports include a visual guide for app installation, resources related to common family questions, and availability of study personnel to guide families through installation and provide support.

Conclusions: Results of this study could support an innovative way for the EI system to communicate and connect with families, providing families with a means through which to communicate their satisfaction and frustration and, through the supporting materials, access the supports they need to be more active participants in their child’s care.
**Background:** Autism and other developmental disabilities exist in every racial/ethnic, cultural, and linguistic group, nonetheless, minoritized children and families experience disparities in access to a timely identification, diagnosis and services (Magaña et al., 2017; Stahmer et al., 2019; Luelmo et al., 2022). California delivers free services (e.g., applied behavioral analysis, speech and language therapy, occupational therapy) to individuals with developmental disabilities throughout the State through a network of independently operated non-profit, community-based organizations called Regional Centers (California Department of Developmental Services, 2022). Throughout the State of California, there are 21 Regional Centers (RC) attempting to provide services to every geographic region and racial/ethnic, and linguistic group throughout the most populated State in the US. The California Department of Developmental Disabilities oversees and provides funding to each independent RC based on the purchase of services (POS) they provide to each family. Annually, each RC is mandated to publish data on expenditures by race/ethnicity, home language, disability, and other variables. This study is an examination of disparities in services access for families with developmental disabilities by race/ethnicity and language in the state of California.

**Objectives:** RQ1: What are the expenditures (i.e., Purchase of services) of Regional Centers statewide by race/ethnicity? RQ2: What are the expenditures of RCs by home language in California? RQ3: Are there any disparities in service expenditures by race/ethnicity and/or home language?

**Methods:** In this study and in collaboration with two community-based organizations, we extracted publicly Purchase of Service (POS) data for fiscal year 2020-2021 for each of the 21 RCs in California. Using descriptive and comparative statistics, we analyzed each RC POS expenditures for each RC by race/ethnicity and language. We then compiled the Statewide data and compared the percentage of the population with the percentage of actual expenditures by race/ethnicity. We continued with the same analytic strategy using language as the variable.

**Results:** Disparities were evident by race/ethnicity. White individuals represented 28% of the population, but received 45% of the actual expenditures across the State. Latinx/Hispanic individuals represented the group with the highest disparity observed. Latinx families represented 40% of the population, but only received 28% of the POS expenditures. Disparities in POS were also evident for Asian, Black, and other ethnicities, but to a lesser degree. (See graph 1). Similarly, English-speaking families represented 77% of the DDS population but obtained 86% of expenditures. Spanish speaking families represented 19% of the population but only obtained 13% of the POS expenditures (see graph 2).

**Conclusions:** Disparities in service access by race/ethnicity persist despite efforts in the field to ameliorate the issue. This is particularly problematic for Latinx, Spanish speaking families (Lopez et al., 2019; Iadarola et al., 2020; Luelmo et al., 2021). This study provides further evidence of this issue. Additionally, this study sheds light on the role of language particularly for Spanish speaking families and provides future directions for intervention development.


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**Background:** Evidence-based practices (EBPs) are interventions or occupational practices backed by scientific evidence (Spring, 2007). They are essential for advancing community practices, especially in the field of clinical psychology and developmental disabilities. While creating EBPs is the first step, disseminating them to the community and practitioners who implement them is a critical and often overlooked component. This results in EBPs becoming “stuck in academia” and creates a research-to-practice gap (Rynes et al., 2007). The PEERS® Intervention is an evidence-based social skills curriculum that has been adapted for multiple age groups (Estabilllo et al., 2022) and offers certified training to mental health professionals and educators across the globe. With advances in telehealth and remote services, there may be even wider opportunities for more productive dissemination of EBPs, especially those addressing social skills, relevant to autistic individuals (Kamei & Harriott, 2021). Despite having trained tens of thousands of professionals in PEERS®, little is known about the effectiveness of these dissemination efforts via remote delivery.

**Objectives:** This study aims to explore the feasibility and acceptability of the PEERS® Certified Teleconference by examining participant evaluation data following certified training offered through an online platform.

**Methods:** The current study examined the effectiveness of a three-day PEERS® for Adolescents (Laugeson & Frankel, 2010) Certified Teleconference conducted over Zoom for 289 professionals. Participants included 209 professionals who worked or resided in the U.S., and...
80 professionals from outside the U.S. Among the 242 participants reporting degrees and job titles, 60% had obtained a master’s level degree or higher and all who reported employment worked in a behavioral, educational, or healthcare setting. Trainings were led by UCLA PEERS® Certified Trainers and included approximately 24-hours of intensive instruction in which curriculum content and evidence-based strategies for teaching social skills were reviewed via training videos and presentation of telehealth materials. Participants completed demographic questionnaires and a post-training survey which assessed satisfaction with the training and other domains.

Results: Of the 147 participants who completed post-training forms, 70% reported that the session was above average or excellent in effectiveness, 98% reported at least an above average likelihood for the training impacting their practice, 97% indicated the training was relevant to their work, and 95% indicated at least a good ability to deliver the intervention to their patients. Seventy percent reported average knowledge of the material and field prior to the training, and that number increased to 99.3% post-training. Approximately 88.4% indicated this training advanced their scientific knowledge, and 98% endorsed the training as providing evidence-based medical practice.

Conclusions: Findings suggest that behavioral, educational, and mental health professionals were highly satisfied with the dissemination of the PEERS® for Adolescents certified training via a remote delivery platform, supporting the acceptability and feasibility of the training efforts. With advances in telehealth and remote services, this study demonstrates that there may be even wider opportunities and increased desire for dissemination of EBPs, especially those addressing social skills, relevant to autistic individuals.

406.364 (Poster) Early Intervention Providers’ Perspectives about Referring Children for Autism Evaluations
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Background:

Early Intervention (EI) is known to be a crucial service to improve developmental outcomes among children with autism. Newly diagnosed children are increasingly referred into EI programs, as demonstrated by growing numbers of children with autism utilizing EI services. However, no known study examines the perspectives of EI providers about referring a child already receiving EI for an autism evaluation. Prior research shows that EI providers often have reasonable clinical suspicion that children they work with have autism, but do not feel comfortable formally making diagnoses. Previous research does not acknowledge the specific challenges EI providers experience in referring children to pediatricians or specialists for autism evaluations, a gap we aim to address.

Objectives:

We explore the unique experiences of EI providers in referring children for autism evaluations. Specifically, we use semi-structured interviews to investigate the factors that prompt them to make referrals, influence their approach to these conversations with families, and prevent or facilitate raising their concerns.

Methods:

We conducted semi-structured interviews with 14 EI providers in New Jersey. Participants were recruited via email from EI agencies throughout the state. Verbal consent for research participation was received prior to interviews, which were conducted on Zoom and lasted 20-60 minutes. The interview included 13 open-ended questions about their feelings, opinions, and experiences as EI providers, their experiences working with children who may or may not have autism, how they make referrals for autism evaluations, and how they decide to make referrals. Respondents received a gift card for their participation.

Results:

We used inductive thematic analysis to identify four primary themes common to all interviews. First, EI providers have knowledge and understanding about autism and its signs, and therefore can identify if a child should be referred for autism evaluation. Second, systemic and family-centered barriers and facilitators inform whether EI providers make referrals. Barriers include individual EI agencies’ rules about avoiding the word “autism,” waitlists for evaluations, socioeconomic status of families, perceived rapport with families, parents’ reactions to referrals, and families’ variable adherence to recommendations. Facilitators include families mentioning autism before the provider does, developing rapport with families over time, and providers’ personal experiences (for example, their own children’s autism diagnoses). Third, whether providers decide to make referrals, and their reasoning for their choices, is variable; there is no standardized approach to making referrals. Fourth, EI providers do not consider making diagnoses as one of their roles, despite their competence in identifying the signs of autism.

Conclusions:

We have identified aspects of the referral process from EI to autism evaluation that are shared among EI providers. Importantly, we found that the approach EI providers choose to take to make referrals is not guided by the value an autism diagnosis has for a child’s long-term
outcomes, but by systemic and perceived family-centered barriers and facilitators. Understanding the challenges inherent to referring children to autism evaluations may help inform a more standardized model for navigating this complex, but crucial, discussion with families.

406.365 (Poster) Echo Seminars for Interprofessional Collaboration Around Autism
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Background: Children with Autism Spectrum Disorders (ASD) often require supports from a range of professionals with unique expertise, but few professionals have opportunities to experience and practice cross-professional collaboration. Extension for Community Healthcare Outcomes (ECHO) seminars are virtual (zoom-based) meetings that allow professionals across professions and roles (community providers, faculty, students, and related professionals) to gather around one common topic. The model has been used effectively in health care, and includes both a didactic component as well as case consultation and discussion.

Objectives: Examine the potential of ECHO seminars to recruit and engage diverse education and speech-language pathology students and professionals around autism. In addition, participant ratings of seminar quality and impact were also explored.

Methods: An ECHO seminar series was created by faculty in Speech-Language Pathology (SLP) and Special Education. Students, faculty, and community SLPs, educators, and other professionals were targeted to join the ECHO seminars. So far, 11 seminars have been held, but another 5 will be offered before March, 2023. Recruitment of participants included wide dissemination of meeting announcements across university listserves, program alumni, community clinical supervisors, and faculty at other universities in related areas. All attendees were asked to complete surveys at the end of each seminar and rate their impression of the quality of the seminar, as well as how likely they were to change their clinical practice as a result.

Results: Preliminary data suggest that an average of 31.78 people have attended each seminar, with a mix of university faculty, students, and community professionals (predominantly SLPs within school districts, as well as teachers). Case consultation has included cases on a wide range of client ages and presenting challenges and didactic lectures have included topics such as the Cultural Acceptability of ABA Interventions, and Sex Differences in Brain Patterns and Autism. Attendee ratings show high interest in the topics (average rating 4.7/5) and ratings of the quality of the presentations (4.8/5). Sixty-seven percent of attendees also report that they are likely to change their practice as a result of attending the seminars.

Conclusions: ECHO seminars have the potential to bridge interdisciplinary barriers and bring professionals together around common topics in autism. Key considerations, however, are the topics chosen and dissemination methods to draw in attendees. Methods to increase participation from all attendees across disciplines during sessions will also be reviewed.

406.366 (Poster) Educator Attitudes to Inclusion of Children on the Autism Spectrum in Early Childhood Education
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Background: Early childhood education and care services provide valuable opportunities for learning, social development, and connection for children from infancy to school age. While the right to inclusion for all children is enshrined philosophically and in law, many families of children on the autism spectrum report experiencing barriers to their children’s inclusion in these early learning environments. Research in education more broadly shows that educator positive attitudes to inclusive education are a key factor for successful inclusion of students on the spectrum at school age. However, there is limited research into the attitudes of educators working in early childhood education and care services which are provided before children start school. Understanding these early attitudes and predictors of attitudes is important to support early success in educational settings, to support child participation, and to support families.

Objectives: Our aim was to understand predictors of attitudes to inclusion of children on the spectrum in early childhood education and care services. Specifically, we sought to explore whether autism knowledge, self-efficacy to work with children on the spectrum, and/or feelings of burnout in educators would significantly predict attitudes.

Methods: Participants included 163 (96.9% female) early childhood educators who completed an online quantitative survey of their attitudes to inclusion (Teacher Attitude to Inclusion Scale), knowledge of autism (Knowledge Subscale, Autism Inclusion Questionnaire), self-efficacy (Autism Self-Efficacy Scale for Teachers), and feelings of burnout (Maslach Burnout Inventory – Educators Survey). Measures selected showed reliability and validity for school settings and were pilot tested for content validity and appropriateness of wording with early childhood educators before administration with minor changes to wording to this context incorporated in the final survey.

Results: More positive attitudes to inclusion were correlated with higher autism knowledge with a medium effect, higher self-efficacy with a medium effect, and lower general and inclusive-education-related burnout with small and large effects respectively. Educators with autism-specific training showed higher self-efficacy, but did not differ from those without training, in attitudes to inclusion. Knowledge,
self-efficacy, and burnout, each contributed unique variance to the prediction of attitudes towards inclusion in a multiple regression, with the overall model also predicting a significant proportion of the variance in attitudes.

Conclusions: Our findings highlight potential avenues to support early childhood educators to build more positive attitudes to inclusion of children on the spectrum, through increasing knowledge of autism and self-efficacy, and reducing feelings of burnout.

406.367 (Poster) Effect of Family Navigation on Engagement in Part C Early Intervention Services Among Children with Increased Likelihood of Autism

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Background: Children in the US who are under 3 years old and have developmental conditions or delays are eligible for Part C Early Intervention (EI) services under the Individuals with Disabilities Education Act. Services include developmental evaluation and support, physical and speech therapies, and social work. EI services have been shown to reduce autism symptoms and promote healthy development among young children. However, EI engagement remains low, particularly among children from structurally marginalized communities.

Objectives: We investigated whether family navigation (FN) improved EI engagement following positive primary care screening for autism compared to conventional care management (CCM).

Methods: We conducted a randomized clinical trial among 339 families of children (ages 15-27 months) who screened as having increased likelihood for autism at eleven urban primary care sites in three cities. Families were randomized to FN or CCM. Families in the FN arm received community-based outreach from a navigator trained to support families’ efforts to overcome structural barriers to autism evaluation and services. EI service records were obtained from state or local agencies. The primary outcome, EI service engagement, was measured as the number of days from randomization to first EI appointment.

Results: EI service records were available for 271 children. The majority of children were publicly insured (222 (81.9%)) and had parents who self-identified as Black, Indigenous, or People of Color (254 (93.7%)); 57 (21.0%) parents spoke a language other than English.

More than half (156 (57.6%)) of children were not EI engaged at study enrollment. A greater proportion of children receiving EI at study enrollment were born premature (No EI: 10%, EI engaged: 18%, p=0.04), had siblings (No EI: 62.8%, EI engaged: 77.2%, p=0.01) and had parents who did not work outside the home (No EI: 43.6%, EI engaged: 57.0%, p=0.03) than their non-engaged peers.

Among the children not EI engaged at study enrollment, 87 (56%) received FN and 69 (44%) received CCM (Table 1). A greater proportion of children receiving FN had public health insurance (p=0.02) and lived in single head-of-household families (p=0.04). Twenty-two (14%) children previously received EI but not within 30 days prior to study enrollment (mean=249.4 days, standard deviation (sd)=198.9).

Children were followed for 100 days after diagnostic ascertainment or until age three. The Kaplan-Meier plot (Figure 1) shows time to EI engagement for the 156 children not engaged at study enrollment. The difference between treatment arms emerges by day 50 and peaks approximately 100 days after study enrollment.

The Cox proportional hazard model, controlling for EI engagement within 30 days before enrollment, parental marital or cohabiting status, and insurance type, clustered on site, showed that families receiving FN were 54% more likely to engage in EI than those receiving CCM (1.54 (95% CI: 1.09-2.19), p=0.02). Sensitivity analyses using a 60-day cut-off for EI services prior to study enrollment and that multiply imputed data on the 68 children for whom EI data was unavailable were consistent with the analysis presented here.

Conclusions: FN improved the likelihood of EI engagement among urban families from marginalized communities.

406.368 (Poster) Embedding Autism Evaluations in Primary Care Decreases Time to Diagnosis

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Implementation facilitation serves a vital role in the adoption and use of high-quality, evidence-based practices in community settings, which are often particularly scarce for autistic youth. Facilitators serve the role of overseeing and enabling an agency’s implementation team and implementation process through ongoing interactions and regular meetings, ensuring the team understands and works through the various steps of the implementation framework. The Autism Community Toolkit: Systems to Measure and Adopt Research-Based Treatments (ACT SMART; Drahota et al., 2014) is a five-phase implementation toolkit adapted from the EPIS framework (Exploration, Adoption Decision, Preparation, Implementation, Sustainment; Aarons et al., 2011; Drahota et al., 2021). Each EPIS phase was comprised of steps and activities that facilitate movement within and between phases. In a pilot study on facilitators and barriers to using ACT SMART, qualitative thematic coding revealed that agency implementation teams reported that facilitation was a key factor in enabling successful toolkit use. Specifically, teams valued facilitator responsivity, supportiveness, and flexibility, and valued the role of facilitation meetings in providing accountability for and clarification around the process (Sridhar et al., 2021).

Objectives: Quantitatively evaluate implementation facilitator and implementation team perspectives on the ACT SMART facilitation process.

Methods: Three facilitators (66.6% female, 66.6% with Ph.D., ranging from 21-38 years old) rated the feasibility, utility, and satisfaction with facilitating implementation teams through ACT SMART after each EPIS phase (except sustainment) on five-point Likert scales, where 5 is the strongest rating. Thirteen implementation team members from six community-based autism agencies (4 providing ABA, 1 providing Speech/Language services, 1 delivering both ABA and mental health services) also rated their experiences with the implementation facilitation and their team’s specific facilitator(s) at the end of the study. Ratings were coded to match facilitator ratings and ranged from 1-5, with higher scores indicating more positive experiences with the facilitator and facilitation process from the implementation team’s perspective.

Results: Time between referral and completing a two-day diagnostic evaluation embedded within primary care (M = 98.18 days; SD = 67.28) was significantly shorter than previous standards of care that required referral to a tertiary care center (M = 158.08 days; SD = 85.34), t(136) = -3.83, p < 0.001.

Conclusions: Data suggest that an integrated autism diagnostic clinic in primary care has the potential to significantly reduce time to access autism evaluations which could lead to earlier access to intervention services. The program was successful in addressing the needs of families with limited access to resources based on socioeconomic status or race. Expansion of such programs, which increase provider capacity and provide wraparound services in the medical home, has the potential to decrease racial and socioeconomic inequities in access to autism diagnostic services.

Acknowledgments: This work was supported by the Office of Research and Economic Development at Virginia Tech, the National Institute of Mental Health, and the National Institute of Child Health and Human Development. We thank all participants and the Autism Community Toolkit: Systems to Measure and Adopt Research-Based Treatments (ACT SMART) for their contributions to this project.


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Results: Overall, facilitators rated the ACT SMART facilitation process as feasible (mean ratings across phases = 3.9 – 4.0), useful (means = 4.6 – 4.8), and satisfactory (means = 3.9 – 4.6; see Figure 1). Feasibility and utility were comparable across phases; satisfaction decreased slightly in Planning and Implementation phases, but remained positive across timepoints. Likewise, implementation team members rated their ACT SMART facilitator(s) positively on helpfulness and responsiveness and the implementation facilitation process highly on feasibility, satisfaction, and convenience (mean = 4.5).

Conclusions: Facilitation is a crucial part of the implementation process by ensuring that agency implementation teams understand and are accountable for completing the implementation process. Facilitators of the ACT SMART implementation toolkit aim to provide these benefits, while being flexible, supportive, and responsive. Data indicate positive perceptions of ACT SMART facilitation by facilitators themselves and implementation team members, including feasibility, utility, and acceptability. Ongoing qualitative analyses of facilitators’ perspectives expand upon these quantitative data and inform tailoring the facilitation process for future use of the toolkit, with the goal of further increasing the impact of the facilitation process role in the implementation of evidence-based practices.

406.370 (Poster) Evaluation of a Province-Wide ASD Family Service Navigation Program
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Background: Early evidence-based treatment improves long-term and short-term outcomes for autistic children, but timely access is challenging due to long waitlists and complex service landscapes which span educational, medical and social service sectors. Also, low income, minority, and non-native speakers may experience additional post-diagnostic treatment delays, creating service access inequities. Family Service Navigation is an intervention which addresses delays and disparities in health care access by providing caregivers with educational and facilitative services. It is particularly relevant for self-directed funding models of care which allocate government funds directly to families to purchase needed autism treatment services themselves rather than funding regional treatment centres.

Objectives: This study describes Autism Ontario’s province-wide Service Navigation Program (SNP) which was designed to promote timely and equitable access to self-directed funding for autism treatment services for the caregivers of children aged 18 or less with a known or suspected diagnosis of autism. Results of an external evaluation of the SNP are shared including evaluation of program adaptations to cope with pandemic-related restrictions that significantly altered program operation.

Methods: McMaster Autism Research Team, the Offord Centre for Child Studies, and the Centre for Health Economics and Policy Analysis conducted an external evaluation of the SNP using mixed methods. A review of SNP activities was first conducted using administrative data derived from customer service software that documented information such as client demographics, number of clients, contact reasons, and response time. In addition, 16 Service Navigators were surveyed though an online platform to gather staff impressions of program reach, utility and effectiveness. Qualitative analysis of open-ended staff survey responses used an open coding approach whereby responses were grouped into categories and concepts then labelled to search for recurring categories and emergent themes. The qualitative survey data was integrated with program data for convergence and expansion.

Results: From July 1, 2019 to March 31, 2020, 4,046 unique families across Ontario were supported by 18 Service Navigators. Contact reasons included information about provincial autism services (48%), funding specifics (9%) and other topics (33%) such as diagnostic resources, mental health concerns, respite, school, and crisis management. On average 4.2 business days elapsed from completion of a service request form to first contact with the local Navigator. First contact averaged 26 minutes. SNP clients reporting a first language other than English or French (17%) was well in excess of the provincial population base rate (3%). Navigators viewed COVID-19 driven virtual service delivery as effective and extending reach to busy families, those without respite, and those living remotely. Virtual contact posed difficulty when assisting families to complete funding application forms.

Conclusions: Autism Ontario’s Service Navigation Program offered immediate, practical assistance and continued to engage families during the pandemic. Outreach to those who do not fluently speak either official language was a program strength. Key recommendations included establishment of a direct link to diagnostic hubs to expedite SNP contact and evaluation of client satisfaction with navigation using standardized measures while taking into account how satisfaction is influenced by caregiver perceptions of local service availability.

406.371 (Poster) Examining Early Intervention Providers’ Perception of Implementing Parent-Mediated Intervention Models
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Background: State funded Early Intervention (EI) programs provide children and families with the necessary tools to navigate autism spectrum disorder and developmental delays by teaching caregivers to implement evidence-based intervention strategies. Parent mediated
interventions (PMIs) are one example of an effective approach in EI (Nevill et al., 2018) that have been the focus of implementation efforts within EI systems (Stahmer et al., 2020). While the effectiveness of PMIs has begun to be established within EI systems, less is known about the EI provider’s experience implementing PMIs, the adaptations they perceive necessary to the programs, and their continued use of these programs outside the scope of research. This study’s aim is to examine EI provider feedback on their experience delivering one of two PMIs and their intentions to sustain the intervention models.

Objectives: Study objectives were to: 1) Examine EI providers’ perspectives on the feasibility and acceptability of delivering one of two PMIs, Project ImPACT (Ingersoll & Dvortcsak, 2019) or Autism Navigator, an online resource platform on autism and relevant; 2) Understand the reach of these programs to children enrolled in EI services; and 3) Examine providers’ intent to sustain the programs following training and implementation efforts.

Methods: Twenty-five providers within Georgia’s state-funded EI system participated in an exit interview after receiving training in either Project ImPACT or Autism Navigator and attending 12-13 weeks of group consultation. All providers identified as female and from diverse disciplinary backgrounds, including special instruction, speech language pathology, and service coordination. The exit interview was semi-structured and questions focused on 1) overall impressions of the relevant training model; 2) how providers decided to deliver the intervention model to and why; 3) whether the intervention was delivered to families on the provider’s caseload in addition to those seen in the context of the research study; 4) the feasibility of learning and implementing Project ImPACT or Autism Navigator; 5) any adaptations made to the intervention; and 6) providers’ intent to sustain the intervention with their future EI families. Thematic analysis was used to summarize primary qualitative themes.

Results: Qualitative analysis is ongoing. Primary themes present in the interviews included providers’ overall satisfaction with both Project ImPACT and Autism Navigator, adaptations made based on family needs and priorities, the number of families who received the interventions and plans for future implementation.

Conclusions: Preliminary results from this study suggests that providers perceive both Project ImPACT and the Autism Navigator feasible to implement although may be adapted in response to specific family circumstances or service delivery models. Importantly, although providers reported delivering both intervention models to many families on their caseload, they also described specific decision they weighed in who they delivered the programs to. Limitations include not having exit interviews from providers that prematurely ended training or did not enroll in training. Continued investigation into the decision-making processes EI providers make when implementing PMIs is needed. Future work is also needed to assess these decision-making processes in providers who choose not to enroll or prematurely drop out of training.

406.372 (Poster) Examining IEP Services for Autistic and Anxious Youth from Diverse Communities: Comparing Services Based on Race, Ethnicity and Gender

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Background: Autistic children have high rates of anxiety that significantly affect functioning across settings (van Steensel et al., 2011). Yet, many autistic youth are not able to access mental health services in the community due to systemic barriers, and this is particularly true for youth from historically underserved communities (Zuckerman et al., 2017). It is critical to provide school-based supports to these children as their mental health needs can significantly impact access to education. Unfortunately, there has been a history of racial/ethnic disparities in education services and placement for non-autistic students (Skiba et al., 2016). Therefore, it is critical to understand what services (including mental health) autistic youth with anxiety are receiving in schools and whether there are differences in the amount and type of services received based on race or ethnicity. It is also important to examine any differences in IEP designation as educational category often dictates service provision.

Objectives: 1) To examine the IEP designation, time spent in general education and amount and nature of mental health services for students with ASD or suspected ASD and anxiety; and 2) determine if there are differences in these factors by race, ethnicity, or gender.

Methods: Seventy-seven children 8-14 years old (mean age=11.10 years, SD=1.82 years; 77.9% male) with diverse racial and ethnic identities (37.7% POC, 62.3% non-Hispanic white) with autism or suspected autism and anxiety were enrolled in a school-based anxiety program (Facing Your Fears-School Based, FYF-SB). Inclusion criteria: Exceeding clinical threshold on the SCARED (Birmaher et al., 1999), T-scores above 60 on the SRS-2 (Constantino & Gruber, 2021), and estimated IQ above 70. All children had an IEP and presented with clinically significant symptoms of ASD on the SRS-2 (Mean=72.50, SD=10.32).

Results: Results indicated a wide range of services were provided across participants with time in general education ranging from 32% to 100%. Mental health services ranged from no mental health supports to 4 hours per month. However, there were no significant differences in mental health minutes by race, t(69)=1.12 p=.27, or gender, t(69)=-1.09 p=.28, nor were there differences in percentage of time in
In Australia across school contexts, individualized accommodations (or reasonable adjustments) in consultation with the caregivers are required under the 2005 Disability Standards for Education. For students with a diagnosed disability, schools are required to ensure that reasonable adjustments are made to support a student’s participation in a course, program, or use of facilities or services. Despite the requirement for reasonable adjustments being mandated, the process for creating individualized goals is not nationally mandated or standardized, and stakeholders acknowledge the challenge of ensuring this process results in meaningful learning for their students. To address this challenge, the Collaborative Model for Promoting Competence and Success (COMPASS) was adapted for use in Australian schools. Results of a randomized-controlled trial confirmed that students in the COMPASS group demonstrated more growth on individual goals than students in the services as usual group ($t(39) = -9.37, p < .001, d = .65$).

Objectives: This presentation aims to detail (a) how COMPASS was adapted and put into practice by community-based trainers, (b) what the student outcomes result demonstrated, and (c) results from a qualitative analysis of stakeholder feedback.

Methods:

In total, 91 participants including an intervention and services as usual group participated in the trial of COMPASS: consultants ($n = 15$), teachers ($n = 36$), and students and their parents/caregivers ($n = 40$). Adaptations were made before beginning COMPASS with a working group of stakeholders, and participant feedback on COMPASS was sought after completion in multiple formats (e.g., focus groups, interviews, and open-response questions). We adopted a participatory approach throughout the project life cycle, working closely with an autistic research assistant.

Results:

A working group of stakeholders initially provided feedback on how best to adapt COMPASS, and an implementation science framework was used to guide the adaptation process. Following the trial of COMPASS, qualitative analysis of feedback from stakeholders resulted in five themes, which summarized perspectives from parents/caregivers, teachers, and consultants who participated in COMPASS. Overall, participants felt COMPASS was a positive experience implemented in the future. However, certain features of COMPASS were more accepted (e.g., GAS, COMPASS profile) than others (e.g., coaching) due to day-to-day challenges faced by the participants (e.g., time constraints, number of students in a classroom). The implications of COVID-19 will also be discussed, as the study took place in 2021.

Conclusions:

This project replicated an intervention that provided a standardized framework for improving the quality of goals and progress for school-age autistic students, a challenge that has been acknowledged in Australian practice and research for years. The results of this study suggest that COMPASS can be replicated outside of the US, for diverse school contexts through stakeholder input and intentional adaptation. The success of this intervention in improving student individualized outcomes along with the results of this study demonstrating the satisfaction of stakeholders demonstrates the need for a standardized intervention that supports teachers in this critical practice.
Background:
Growing evidence has demonstrated the importance of providing parents with knowledge and skills to better support children with autism. However, there is a shortage of interventions suited for this population (especially for those facing geographical or socioeconomic disparities) that include program targets for challenging behaviors, parental stress, and parental competency.

COMPASS for Hope (C-HOPE) is an adaptation of the Collaborative Model for Promoting Competence and Success (COMPASS; Ruble, Dalrymple, & McGrew, 2012), originally a parent/teacher consultation intervention that improves social, emotional, and learning skills of children with autism in public schools. COMPASS is personalized to each child’s profile and identifies their unique personal and environmental supports and challenges. C-HOPE follows this framework. In an RCT, C-HOPE reduced challenging behaviors and parent stress, and increased parent competency when delivered across modalities (face-to-face; telehealth) to increase accessibility (Kuravackel et al., 2018).

Objectives:
The aim of this study was to test an adaptation of C-HOPE using an asynchronous, web-based, group discussion board and examining if parents reported less challenging child behaviors, lower levels of stress, and higher sense of competency from pre- to post-intervention.

Methods:
Participants were parents/caregivers of children with autism (aged 3-12 years; 27% of color) that displayed challenging behaviors. Participants were randomly assigned to two intervention groups and completed pre- and post-intervention measures.

C-HOPE is a virtually delivered eight-week program (12 hours total) consisting of individual sessions and group discussion boards addressing parental concerns specific to autism, child behavior goals, stress prevention, and caregiver wellness plans. For this adaptation, participants were able to watch training videos, participate in discussion boards with parents, and access training materials via a web-interface (i.e., Canvas) using an asynchronous group discussion board.

Results:
With the smaller sample size (N = 10) an intent-to-treat analysis was used. Paired sample t-tests were conducted to examine our main outcomes with an emphasis on effect sizes.

Challenging Child Behavior. The C-HOPE adaptation showed significant differences in challenging behavior from pre- (M = 146.40, SD = 35.36) to post-intervention (M = 123.10, SD = 28.35); t(9) = 3.05, p = 0.01; with medium (d = 0.50) to large (d = 0.80) effects size on challenging behavior (Cohen’s d = 0.73).

Parent Stress. Significant differences were found in parent stress from pre- (M = 122.60, SD = 25.73) to post-intervention (M = 109.50, SD = 26.47); t(9) = 2.51, p = 0.03; with a medium effect size (d = 0.50).

Parent Sense of Competency. Results did not show a significant difference in parental sense of competence scores from pre- (M = 55.20, SD = 17.59) to post-intervention (M = 50.50, SD = 17.51); t(9) = 1.11, p = 0.30.

Conclusions:
Results suggest that the web-based asynchronous adaptation for C-HOPE can assist parents in reducing challenging behavior of children with autism and decreasing parental stress by utilizing behavior plans, psychoeducational information, and interacting with other parents via virtual intervention modalities. Discussion will focus on the impact telehealth-based intervention services, like C-HOPE, can have on broadening accessibility to at-risk and underserved families.

406.375 (Poster) Examining the Impact of Policy Factors upon Early Autism Diagnosis in Five States: A Qualitative Investigation

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Background: Early diagnosis of autism spectrum disorder (autism) before age three is a public health priority in the United States. Despite this, the Autism and Developmental Disabilities Monitoring Network’s 2018 report discovered that the median age of autism diagnosis in the United States is age 50 months and there is substantial inter-state variability in the average age of autism diagnosis (Maenner et al.,
2021). Examination of state-level policy factors -- defined as laws, regulations, procedures, administrative actions, incentives, or voluntary practices of governments or other institutions (Centers for Disease Control and Prevention, Office of the Associate Director for Policy and Strategy, 2015) -- can elucidate modifiable drivers of early autism diagnosis.

**Objectives:** This study sought to identify policy factors across five states participating in a national autism collaborative (Arizona, California, Connecticut, Massachusetts, and Pennsylvania) that impact access to early autism diagnosis.

**Methods:** We conducted semi-structured interviews by telephone or video conference from February 2021 to June 2022 with a purposive sample of autism and/or state policy experts across Arizona, California, Connecticut, Massachusetts, and Pennsylvania (N = 54). Nominated sampling was used to determine additional key informants in each state. Interviews were audio recorded and then transcribed. Data were coded using a directed content analysis approach in NVivo.

**Results:** The following four themes related to policy factors influencing access to early autism diagnosis across the five states were identified: (1) screening programs and practices often serve as a bridge between parent concerns about a child’s development and early autism diagnosis; (2) early autism evaluation and diagnostic processes remain highly variable within and across states; (3) workforce availability and licensure issues affect early autism diagnosis; and (4) health insurance policy affects the accessibility of early autism diagnosis. Theme 1 identified state-level trends concerning usage of the Modified Checklist for Autism in Toddlers (M-CHAT), the contextual dependency of autism screening tools, and common referral sources for autism evaluation. Theme 2 identified state-level trends in the administration of provisional diagnoses, usage of gold-standard diagnostic tools (e.g., the Autism Diagnostic Observation Schedule, Second Edition), and incidence of autism diagnosis amongst historically underrepresented groups. Theme 3 identified state-level trends in the availability, including geographic disparities, of the workforce able to diagnose autism, along with the implementation of legislation that dictates the categories of health professionals able to diagnose autism (e.g., nurse practitioners). Theme 4 identified state-level trends (e.g., low reimbursement rates, supplemental reimbursement through programs like the Early Periodic Screening, Diagnosis, and Treatment program) influencing the acceptance of Medicaid in accessing autism diagnostic services. Table 1 displays subthemes and illustrative quotations.

**Conclusions:** This study analyzed state-level policy factors influencing early autism diagnosis in the United States. To effectively promote early autism diagnosis across all 50 states, our study’s findings suggest it will be imperative to implement national policies dictating universal developmental surveillance and screening systems, diagnostic assessment standards across service settings, increased workforce capacity, and equitable insurance reimbursement rates and regulations. Such efforts should be oriented toward advancing equity in early autism diagnosis.

406.376 (Poster) Examining the Individualized Education Program Goal Areas of School-Age Autistic Children Using Latent Class Analysis

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**Background:**Autistic children make up 12% of the children served under the Individuals with Disabilities Education Act and often receive special education services through an Individualized Education Program (IEP). Existing approaches to understanding the IEP goals of autistic children have relied on small samples or focused on narrow goal areas. Approaches are needed to understand if IEP goal areas are heterogeneous among autistic children and if there are multivariate relationships among goal areas that may differ by subgroups of autistic children.

**Objectives:**To examine latent classes of autistic children’s IEP goal areas in academics (reading, writing, math), language, social skills, and behavior.

**Methods:**Data come from an online, national survey of families with a school-age child on the autism spectrum recruited through the Simons Foundation Powering Autism Research for Knowledge initiative. Data were collected as part of a study focused on COVID-19; current data only involve the time period prior to COVID-19 (i.e., 2019 to early 2020 school year). While 811 parents and caregivers completed the survey, this study focuses on the 664 children (82%) who were receiving some form of special education service. Children were predominantly male (80%) and White (73%); half of the sample was eligible for free or reduced-price lunch (49%). Children were distributed across grade levels (K-3 = 32%, 4-6 = 33%, 7-8 = 19%, and 9-12 = 17%) and lived across the United States (Northeast = 21%, Midwest = 26%, South = 33%, West = 21%). Children predominantly attended public school (84%). Parents indicated if their child had an IEP goal (0 = no goal, 1 = at least one goal) in the areas of reading (69%), writing (74%), math (60%), language (75%), social skills (81%), and behavior (58%). We used latent class analysis to examine multivariate patterns of parent responses. Classes were fit sequentially until model estimation failed, and model selection was based on model fit indices as well as theoretical and conceptual support.
**Results:** Though we estimated up to an 8-class solution, model fit statistics (BIC, Bayes Factor, Lo-Mendell-Rubin) endorsed a 3-class solution. Class 1 (*All Goal Areas*; 49%) included children who had a very high likelihood of having goals in all areas (0.81-0.99). Class 2 (*Academic and Language Goals*; 20%) included children who had a high likelihood of having academic (all areas) and language goals (0.68-0.86), some likelihood of having social skills goals (0.51), and a low likelihood of having behavioral goals (0.03). Class 3 (*Social, Behavior, and Language Goals*; 31%) included children who had low likelihoods of having academic (all areas) goals (0.10-0.28), some likelihood of having language goals (0.55) and behavioral goals (0.58), and a high likelihood of having social skills goals (0.78).

**Conclusions:** The IEP goal areas of autistic school-age children are heterogeneous, with findings highlighting the existence of multiple underlying classes. Findings highlight that not all autistic children have the same special education goals. Understanding this heterogeneity is a needed next step to helping researchers and practitioners better meet the diverse needs of autistic children in educational spaces.

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**406.377 (Poster) Examining the Initial Feasibility and Acceptability of Remote Training in Caregiver Coaching for Part C Providers**


**Background:**

The Division for Early Childhood Education recommends building family capacity through practices like caregiver coaching, however a significant research-to-practice gap remains. Thus, there is a critical need to conduct research with community-based EI-providers to evaluate the feasibility, acceptability and social validity of training providers in evidence-based coaching practices.

**Objectives:**

The current study aims to bridge the research-to-practice gap in caregiver coaching in EI by (1) describing a model of remotely training community-based EI providers in Caregiver-Implemented Reciprocal Imitation Teaching (CI-RIT), a parent-mediated naturalistic developmental behavioral intervention (NDBI), and (2) examining providers’ perceptions of the initial effectiveness, feasibility, and acceptability of the model.

**Methods:**

This study is part of an ongoing, multisite randomized controlled trial of the effectiveness of CI-RIT in Part C Early Intervention (EI). Our sample includes 35 EI providers, who were 40.81 years old on average (SD = 9.66). The majority of the providers were white (80%), identified as female (91.4%), and had a Master’s degree (85.7%)(Table 1). Training in CI-RIT includes the following remote training components: (1) completion of self-directed online modules, (2) 12-hour synchronous virtual workshop, and (3) 2-4 role plays in which providers conduct full-length CI-RIT lessons. Immediately post-workshop, providers completed a workshop satisfaction survey containing 3 items rated on a 7-point scale, with higher scores signifying higher satisfaction. They also rated the usefulness of the workshop components (e.g., slides, small group activities) on a 5-point scale, with higher scores indicating higher usefulness. Finally, the providers reported on their perceived CI-RIT self-efficacy with a measure containing 7 items scored on a 7-point scale (1 = “not at all confident,” 7 = “completely confident”). Three months post-training, providers were asked to complete the self-efficacy measure again along with an 18-item social validity scale, a 9-item usability scale, and a 3-item intervention material usefulness scale, rating items on a 7-point Likert scale with higher scores indicating higher social validity, usability, or usefulness.

**Results:**

Providers reported high satisfaction with the workshop content (M = 5.87, SD = 2.03) and the workshop training components (M = 4.72, SD = 0.35). They reported high self-efficacy scores following the workshop (M = 5.78, SD = 0.57), and reported that CI-RIT had high social validity (M = 5.76, SD = 1.25). Preliminary analyses with the first five participants to complete time two data collection, three months post-training, indicates the providers had high self-efficacy (M = 6.62, SD = 0.40), and they perceived the intervention to have high usability (M = 5.62, SD = 0.68), and useful materials (M = 6.27, SD = 1.30). See Table 2 for measure descriptives.

**Conclusions:**

This preliminary evaluation of EI providers’ perceptions of remote CI-RIT training are promising as providers rated high satisfaction and usefulness of the virtual workshop and high feelings of self-efficacy. Further, providers rated the intervention and accompanying materials as having high social validity and usability. Providers’ high sense of self-efficacy demonstrates the potential benefits of an entirely remote training model, an important consideration for broader implementation of caregiver coaching in EI.
Factors Contributing to Caregiver Satisfaction with Autism Spectrum Disorder Evaluation Feedback in the United States

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Background: The current study investigated caregiver experiences with autism spectrum disorder (ASD) evaluation feedback process and factors contributing to caregiver satisfaction. Past literature suggested that caregivers often feel distressed during the feedback session and report dissatisfaction with the provided information. Additionally, some clinicians reported experiencing discomfort when breaking "bad news" to the family and feeling that they do not have sufficient training in this area. These findings are not surprising given the limited number of updated, evidence-based clinical guidelines specific to ASD feedback delivery.

Objectives: The study aimed to evaluate whether factors such as family demographics, diagnostic processes, provider characteristics, and level of emotional distress are associated with caregiver satisfaction with ASD feedback. Given the gaps in the extant literature, the secondary goal was to report on details such as the session length, session participants, and elements included in the feedback process as recalled by the caregivers, intending to elucidate common practices across providers in the United States.

Methods: Caregivers of children previously diagnosed with ASD could participate in the study through an online survey developed by the researchers. The survey was inspired by the Autism Treatment Network feedback guide from 2012, aiming to collect both quantitative and qualitative information about caregiver experiences. The survey was advertised through social media, parenting groups, and US clinics specializing in neurodevelopmental disorders. The study included responses from 268 caregivers across 45 US states.

Results: All predicted covariates (i.e., time since diagnosis, child's and caregiver's age, child's and caregiver's gender, and caregiver's relationship to child) were not significantly related to caregiver feedback satisfaction. The results of multiple regression (F(14, 211) = 45.23, p < .001) indicated that waitlist length and an emotional distress count were negatively associated with feedback satisfaction, while the perceived provider advocacy and the value of caregiver's input showed a positive relationship with the outcome variable. There was not a significant relationship between the feedback satisfaction and demographic factors such as location within provider-shortage area and racial/ethnic minority status, which often act as barriers to health care access. The average satisfaction rate was 71%, which is higher than in past literature, but only 24% of caregivers felt as if they were provided with time to think/process emotions during the session. The most common emotions experienced by the caregivers were sadness, anxiety, acceptance, and relief.

Conclusions: The findings suggest that caregivers who experience strong emotions during the session may still be satisfied with the feedback. Furthermore, the results highlight the importance of continuous efforts to decrease the waitlist time for ASD evaluation as well as the need to put greater emphasis on advocacy and the value of the caregiver input rather than the sensitivity with which the diagnosis is shared. Lastly, through the recognition of factors related to caregiver satisfaction, the study was able to shed more light on clients' wants and needs, which may help inform the development of professional guidelines for feedback delivery in the future.

Females with High Autistic Traits Who Identify As Autistic Are Less Likely to Receive a Diagnosis of Autism.

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Background: Adults seeking diagnostic assessment for autism can be disappointed if the outcome of the assessment is not in line with their expectations. This may be particularly true for adults who identify strongly with autism prior to assessment. There is lack of research on this topic although adults not receiving a diagnosis may account for 50% of diagnostic clinic attendees in the U.K. Screening tools, including autism trait measures are frequently used by clinics to manage diagnostic services, despite the lack of specificity reported.

Objectives: To investigate differences in pre-assessment autism identification and autistic traits in adults attending autism diagnostic clinics who do and do not receive an autism diagnosis.

Methods: Participants were a consecutive sample of adults attending for autism assessment in a UK NHS service between June 2021 and August 2022. 109 referrals (50 male, 59 female, mean age = 33 years, SD=11, range=18-61) who attended clinic received a diagnostic outcome by September 2022. Participants completed the Autism Social Identity Questionnaire (ASIQ, Cooper et al., 2018) and the Autism Spectrum Quotient (AQ50, Ruzich et al., 2015) prior to clinic attendance.

Results:
Of the 109 referrals, 92 (84%) did not receive a diagnosis of autism (no-ASD) and 17 (16%) did (ASD). A MANCOVA analysis explored the impact of outcome (ASD or no-ASD) and sex (male or female) on ASIQ and AQ, controlling for age. There was a significant main effect of sex on AQ50 with females scoring higher than males (39 vs 34: F(1,103)=5.23, p=.024). There was also a significant interaction between sex and diagnostic outcome on ASIQ – males who received a diagnosis (ASD) and females who did not receive a diagnosis (no-ASD) both identified more strongly with Autism prior to clinic attendance, (F(1,103)=6.54, p=.012; see Figure). All other main effects and interactions were not significant (all p>.2). There was a non-significant correlation between AQ50 and ASIQ scores (r(98)=.10, p=.31, controlling for sex, outcome and age).

Conclusions:

This study identified a very low diagnostic rate of autism (16%) for adults attending a UK service when compared with previous UK-based research (70%, Wilson et al., 2016). Cohort differences may account for such variability between UK services, but this warrants further investigation. Females reported significantly higher levels of autistic traits than males prior to assessment. This sex difference is not consistent with sex differences in the general population or autistic populations (Ruzich et al., 2015). Autism traits did not significantly impact on diagnostic outcome, consistent with previous research. These data highlight a group with high levels of autistic traits who did not receive a diagnosis of autism. Finally, males who received a diagnosis of autism and females who did not receive a diagnosis of autism identified most strongly with an autism identity prior to clinic attendance. This suggests sex-specific effects relating to autism identity and formal autism diagnosis.

406.380 (Poster) From Point of First Concern to Follow up after Diagnosis: Enhancing Care in the Medical Home for Patients with Autism Spectrum Disorder


Background:

Primary care providers (PCPs) are expected to help families navigate next steps after an ASD diagnosis. However, PCPs often do not receive sufficient training in providing follow-up care, parents report inadequate guidance related to next steps, and care coordination for ASD is often inconsistent and disjointed within primary care settings.

Objectives:

To evaluate the impact of an ASD pathway that includes streamlined/embedded assessment and routine PCP follow-up after ASD diagnosis within a busy academic medicine clinic.

Methods:

Our study population consisted of children aged <48 months receiving care in a large primary care clinic that includes 83 residents, 9 nurse practitioners, 17 attending faculty pediatricians, and two embedded psychologists. Children who were identified through standard screening protocols were referred to an embedded provider for tiered evaluation. If diagnosed with ASD, children were automatically scheduled for follow-up with their PCP. To increase access, families were given the option to have either visit via telehealth. For the follow-up visit, PCPs were trained in the use of the novel note template and order smart set that integrated best practices, including discussion of genetic testing, referrals for therapy, discussion of co-occurring concerns, and smart phrases to provide educational and practical resources for families. Extracting data from the electronic health record (EHR), we tracked ASD-specific appointments and provider actions in response to ASD concerns. Baseline data were extracted from the EHR for the 12 months prior to intervention. Our team used monthly Plan-Do-Study-Act (PDSA) Cycles to monitor intervention outcomes and overall improvement related to wait times for ASD diagnosis, latency to follow up visits, and use of EHR templates designed to guide and track clinical practices. Additionally, REDCap surveys were sent to PCPs to assess satisfaction and template usability.

Results:

Median wait time between initial referral and diagnosis during the project period was 32 days. In the 12 months prior to intervention, 71 patients received an ASD diagnosis with a mean of only 21% receiving an ASD-specific follow-up visit (median 53 day wait). In the 13 months following project launch, 119 children received a diagnosis of ASD with a majority (89%) receiving ASD-specific follow-up (median 47 day wait). Providers used the note template 73% of the time, providing ASD-specific guidance and resources to caregivers. Genetics testing was discussed with 67% of patients seen after ASD diagnosis (increase from 13% baseline) and testing was consented to and/or obtained by 43%. REDCap surveys indicated a high degree of usability with the template, high satisfaction with the new system, and high agreement that the follow-up protocol helped providers “better follow best-practice guidelines for general ASD care.”
Conclusions:

Results demonstrate sustained improvement with children receiving a timely ASD diagnosis as well as a significant increase in PCP follow-up visits. Clinical decision-making templates embedded within the EHR led to important practice change, with PCPs reporting feeling more equipped to discuss evidence-based care and resources. Next steps include ongoing data collection and system-wide dissemination of model to increase efficient and evidence-based management for children with ASD.

406.381 (Poster) Gender-Based Analysis of Educational Outcomes for Kindergarten-to-Grade 12 Students with Autism Spectrum Disorder in British Columbia, Canada

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Background: Autism spectrum disorder (ASD), hereafter referred to as autism, is a neurodevelopmental disability characterized by differences in social communication and interaction, as well as restricted and repetitive interests, activities, and behaviors (APA, 2013). Autism is diagnosed three to four times more often in boys than girls (Baio et al., 2018; Loomes, Hull, & Mandy, 2017) and girls tend to be diagnosed later than boys are (Kavanaugh, 2021). This gender bias in diagnosis is attributed to factors such as camouflaging, which involves copying or masking personality traits or behaviors to adjust or “fit in” to their social environment (Lai & Baron-Cohen, 2015). As a result, autism in girls is more likely to go undetected and remain undiagnosed. The delay or absence of a formal diagnosis has implications related to accessing specialized supports and services. During their formative education in elementary and high school, gender differences, particularly recognition of autism among girls, may have serious implications with respect to educational outcomes.

Objectives: We seek to investigate the educational journeys of students who received an ASD designation from Kindergarten to Grade 12, and to conduct gender-based analyses to explore how gender may influence these journeys over time. (Note: Students must have a formal autism diagnosis to obtain this designation.)

Methods: This is a secondary analysis of student-level data regularly collected by the Ministry of Education and Child Care in British Columbia, Canada. The working sample consists of students from eight annual cohorts who began Kindergarten between the 1999/2000 and 2006/2007 school years (inclusive), and follows them forward in time to when they should ideally have reached Grade 12 or equivalent, up to and including the 2018/2019 school year. Specific outcomes explored are: grade-to-grade transition paces, consistency of designation across school years, time to initial designation, high school completion credentials, and rates of school completion.

Results: The sample consists of 4,287 students with an ASD designation: 3,547 (82.7%) boys and 740 (17.3%) girls. Preliminary findings show that almost half (46%) of students began school with an ASD designation, versus 22% who were designated for the first time after being in school for five or more years. Over half of the students (56%) proceeded through school at a typical pace (one grade level per year). The majority of students (84%) completed high school with some type of credential (in BC, there are three types of high school completion credentials).

Conclusions: Results demonstrate that more boys than girls obtain an ASD designation, which reflects rates in the general population. Moreover, there are gender-based differences in educational outcomes that could contribute to inequities in supports among students. Our study also highlights the value of longitudinal, population-level data in conducting gender-based analyses in autism research.

406.382 (Poster) General Education Teachers Knowledge of Autism in Low-Income and Under-Resourced Settings

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Background:

The dramatic increase of autistic students being educated in inclusive settings (Biao, 2014) places a growing responsibility on general educators to implement autistic students’ individual education programs (IEP; Bines & Lei, 2011). Yet many general educators have limited knowledge about autism, or evidence-based interventions to support these students (Connor & Ferri, 2007; de Boer et al., 2011). Teachers in low-income or under-resourced settings report limited time for collaboration and lack of school-wide support as barriers to the effective inclusion of autistic students (Iadarola et al., 2015).

Objectives:

The current study examined general education teachers’ knowledge and understanding of autism using The Autism Awareness Survey (Heidgerken et al., 2005; Tipton & Blacher, 2013).
Methods:

The study included 173 general education teachers across different grade levels (preschool=3, TK/K= 20, 1st-5th grade= 67, 6th-8th grade= 38, 9th-12th grade= 45). Approximately 80% (n=139) of the teachers were female and the teachers’ average age was 47.65 years (SD= 24.23 years). The teachers also ranged in their years of experience (M= 16.17 years, SD= 9.35 years). Teachers were from 28 different school districts in the Southwestern region of the United States and 76% of the teachers (n=132) worked in Title I schools.

Teachers completed The Autism Awareness Survey (Heidgerken et al., 2005; Tipton & Blacher, 2013) online through Qualtrics. The survey consisted of 14 statements of beliefs about autism, and participants were asked to rate these statements on a 0-4 scale (Disagree, Agree, Somewhat Disagree, Neutral, Somewhat Agree, and Agree). For analyses, the items were translated to a 5-point correctness scale. For statements that were true, the scoring would range from agree=4 to disagree=0. For statements that were not true, the scoring would be reversed, ranging from agree=0 to disagree=4. The total correct score for the 14 items could range from 0 to 56. The items are also divided into three categories: correct, incorrect, and neutral.

Results:

The total correct score for the 14 items ranges from 28 to 56, with the mean of 41.28 (SD= 6.81). The three statements were the highest correct responses were: 1) There is one intervention that works for all children with autism (94.71%), 2) Children with autism can grow up to live independently (97.67%), and 3) There is a cure for autism (88.24%). The three items with the highest incorrect responses were: 1) Changing a child’s diet will lessen the severity of autism symptoms (32.35%), 2) Autism a developmental disorder (30.18%), and 3) Autism is an emotional disorder (30.23%).

Conclusions:

This study contributes to existing research by focusing on general education teachers’ knowledge of autism. Findings corroborate previous research that identified similar patterns of correct and incorrect knowledge of autism among university faculty (Tipton and Blacher, 2013). Results highlight areas of professional development about autism and evidence-based interventions that are needed to mitigate misinformation among general educators who teach in socioeconomically diverse and under-resourced settings.

406.383 (Poster) Homelessness and Autism in Women


Background: Emerging evidence suggests that autistic people are more likely to experience homelessness, and that their homelessness experiences may be different compared to non-autistic people; autistic individuals also report facing additional challenges to resolving their homelessness (Kargas et al., 2019). Homelessness is the result of a multitude of inter-related factors including unemployment, relationship breakdown, lack of social support systems, and mental health conditions (Fazel et al., 2014).Unfortunately, many of these circumstances disproportionally impact autistic individuals. From the limited data that exists, the prevalence of autism in homeless populations has been estimated to be over 12% (Churchard et al., 2019). Despite this, there is limited research on the link between autism and homelessness, and how to best provide services that could prevent or shorten periods of homelessness in this population. These gaps are particularly acute for autistic women, whose experiences of homelessness are often distinct from men’s, and who are an under-represented, but often vulnerable due to high rates of violence and stigmatisation (Bretherton & Pleave, 2018).

Objectives: We aimed to: 1) map gaps in knowledge and practice in the area of homelessness and autism in women; 2) identify priority areas for research; 3) develop recommendations for how to implement novel research and practice in this area.

Methods: We adopted principles of participatory research (Fletcher-Watson et al., 2019) and designed a series of co-production workshops around Freire’s (1970) framework for generating open dialogue and creative listening to generate new ideas. An interdisciplinary group of 26 stakeholders took part, of which six identified as autistic. Participant-researchers were purposively sampled to ensure expertise and representation from a diverse range of stakeholders, and specifically included individuals with lived experience of homelessness, autistic representatives, researchers, homelessness and domestic violence charity representatives, service providers, health professionals and Commissioners (many attendees fitted into multiple categories). Five attendees had experience of homelessness, and three female attendees identified as being autistic and with personal experience of homelessness. All participant-researchers were asked to agree to a set of principles designed to encourage inclusivity and open, active discussion. Each workshop began with narratives from different stakeholders,
followed by facilitated break-out discussion sessions, which were purposely chosen to include a mix of stakeholders in each group. A plenary session at the end of each workshop consolidated discussions, and reached consensus on priority agenda setting.

Results: Two areas of research priority were identified: to map the prevalence and demographics of autistic women experiencing homelessness; and to delineate risk and protective factors for homelessness. Priority areas for improving provision of support included: staff training to improve communication, awareness of autism and building trust with service providers; and recommendations for practical provision of support by services.

Conclusions: Future research is critical to increase our knowledge of pathways leading to homelessness for autistic women, and barriers to engaging with homelessness and social services. We then need to use this knowledge to develop new ways of delivering targeted and inclusive support for autistic women, which could prevent or shorten periods of homelessness.

406.384 (Poster) How Can We Improve Timeliness and Quality of Autism Diagnostic Assessment: Findings and Recommendations from a Realist Evaluation (RE-ASCeD) of Autism Service Delivery in the UK.

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Background:

Referral rates for autism diagnostic assessment in children doubled between 2015 - 2019 (Parr et. al, INSAR 2021) and continue to rise. Teams have experienced growing waiting lists, with families experiencing longer times to complete diagnostic assessment.

Objectives:

To examine autism diagnostic service delivery models in the UK National Health Service to determine which approaches have potential to improve quality and timeliness of diagnosis.

Methods:

This abstract is focused on qualitative analysis of interviews of clinicians, referrers and commissioners (n = 69), and children and young people (n = 20), and focus groups with parents (n = 36), with questions designed in line with realist thinking to determine “what works, for whom, when and under what circumstances”, based in six centres: two Child Adolescent Mental Health Services (CAMHS), two Child Development Teams (CDTs), two integrated CAMHS/CDTs. Teams were selected from prior survey (N=128) of services across the UK NHS, who self-reported meeting NICE Quality Standards for autism assessment. The study also included rapid realist literature review, a survey of current national practice, consensus events, and following realist methodology, developed recommendations to improve practice iteratively.

Results:

Interviews with professionals, parents, and young people revealed frustrations with the system, for example the need to better support families throughout the process and not be left on their own to “fall off a cliff” post diagnosis. Seven key themes were identified where the child and family journey to diagnosis could be improved. Some of the key recommendations are presented by theme, below:

1. **Recognition by potential referrers**
   - Develop system-wide recognition of autism, including training targeted at HVs, GPs, nursery and school staff.

2. **Referral process**
   - Develop better information gathering tools that enable professionals and parents to describe the child effectively.

3. **Service organisation**
   - Co-existing conditions should be diagnosed under a neurodevelopmental umbrella.
• Support and intervention should be available throughout assessment process, not just post diagnosis.

4. **Skill mix**

• Staffing should be based on competency, rather than job title, and be responsive to diagnostic complexity.

5. **Assessment**

• Digital technology may be used judiciously, but, where possible, face to face contact should be an integral part of the assessment.
• Assessment should recognise child’s strengths and needs as well as diagnosis

6. **Report and feedback**

• With parental consent, summary reports should be directly shared with schools.

7. **Training and service development/evaluation.**

• Need to train more staff across core disciplines of MDT and widen pool of autism diagnostic practitioners.

Conclusions:

The results point to areas of good practice and potential solutions that could help to meet increasing demand, and the challenges of under resourcing, increasing case complexity and staff retention and recruitment. Some recommendations focus beyond the diagnostic teams, for example improving recognition by primary care professionals to reduce length of time to obtain a referral. Diagnostic teams could introduce greater flexibility with a tailored approach to assessment, e.g. for children with clear signs of Autism, and adoption of a neurodevelopmental approach that recognises a child’s strengths and needs, and co existing conditions alongside Autism diagnosis.


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Background: Community-based therapeutic services, such as occupational, physical, speech, and behavior therapy, are often considered ‘autism-related services.’ Although they may play a role in important developmental and work-related outcomes, such as promoting community and occupational participation, and reducing the risk of acute psychiatric care utilization, there is some evidence that access to these services decreases with age. Much of existing research, however, utilizes 10+ years old data or relies on patient or caregiver report, or includes only specific age groups.

Objectives: We aim to address these gaps by examining contemporary age-related patterns of therapeutic service utilization for the Florida autistic population across the lifespan. We hypothesized that therapeutic service utilization decreases with age.

Methods: This retrospective observational study is a secondary analysis of Medicaid claims from the OneFlorida Data Trust. We defined therapeutic utilization as the number of ambulatory visits with a provider specialty code for occupational therapy (OT), speech therapy (ST), physical therapy (PT), or behavior therapy (BT). We included patients ages 3 to 64 with an autism spectrum disorder diagnosis (ICD-9: 299.0, 299.1, 299.8, 299.9; ICD-10: F84.0, F84.2, F84.3, F84.5, F84.8, F84.9), with at least one therapeutic service claim during the measurement period (2012-2019). Our final sample was N=20,356 patients. With age and time (measurement year) as the independent variables (covariates sex, race, ethnicity, urbanicity, and therapy type), and therapeutic service utilization as the dependent variable, we constructed a zero-inflated mixed effect model with a random effect on patient ID to account for within-subject correlation, using the glmmTMB package in R.

Results: Holding all other independent variables fixed, therapeutic service utilization decreased with age (β=-0.014, p<0.0001), but the total utilization increased over time (β=0.009, p<0.001). There was also a significant difference between white and nonwhite patients’ utilization (β=0.102, p<0.0001), and a significant difference between Hispanic/Latino and non-Hispanic/non-Latino patients’ utilization (β=0.118, p<0.0001). Specifically, white patients’ utilization was 1.11 times that of non-white patients, and non-Hispanic/non-Latino patients’ utilization was 0.89 times that of Hispanic/Latino patients. Patients in urban areas had significantly higher utilization than those in
non-urban areas at a less significant level ($\beta^e=0.125$, $p<0.05$). There were also significant differences between therapy types: OT and PT were significantly less utilized compared to BT ($\beta^e=-2.598$, $p<0.0001$ and $\beta^e=-0.145$, $p<0.0001$, respectively), and ST was significantly more utilized than BT ($\beta^e=0.168$, $p<0.0001$).

Conclusions: Among the OneFlorida autistic population, therapeutic service utilization decreased with age but increased over time. We identified disparities by race and urbanicity. Surprisingly, Hispanic/Latino patients had significantly higher utilization, suggesting that the Florida Hispanic/Latino population may be gaining equitable access to Medicaid services. It could suggest, however, that non-Hispanic/non-Latino patients are accessing therapeutic services through other systems, i.e., school and private insurance. Finally, ST has the highest utilization, and OT and PT the lowest. More research is needed to identify barriers to receipt of therapeutic services at specific ages, in order to promote equitable access to services that can support community participation.


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Background: Several investigations have determined that deficits in clinical skills and specific knowledge of health professionals contribute to difficulties and limitations in the timing and quality of the provision of primary care services for people with autism and their families (Dillenburger et al., 2016; Harrison, Slane, Hoang, & Campbell, 2017). The lack of knowledge about autism and best practices guidelines leads many professionals to carry out inconsistent clinical practices and provide inefficient care (Heidgerken et al., 2005). Moreover, in developing countries like Argentina, there are other gaps related to the economic cost and language barriers related to autism training and the structurally unequal healthcare systems (Paula et al., 2020; Kleinman, 2009; Demyttenaere et al., 2004). The Extension for Community Healthcare Outcomes (ECHO) Autism model is a movement to de-monopolize knowledge and expand local capacity to bridge many of those gaps. Creating access to high-quality specialists in local communities has proven to be a feasible and effective way to increase local capacity for best-practice medical care for people with autism (Mazurek et al., 2017; Mazurek et al., 2020; Sohl, Mazurek, & Brown, 2017).

Objectives: To assess the effect of an ECHO Autism program implementation on the level of knowledge, perceived self-efficacy, and practice patterns of healthcare professionals. 

Methods: 29 participants -registered from 18 of the 23 provinces in Argentina-participated in 8 monthly 90-minute telementoring ECHO-clinics during 2021. Each meeting consisted of a de-identified case presentation by a community clinician participant and a brief didactic presentation by content experts to address specific knowledge gaps. A mixed-method evaluation was conducted using a battery of self-administered questionnaires before and after participation in the 8 ECHO clinics. A socio-demographic questionnaire, the Knowledge Questionnaire on Childhood Autism among Health Care Workers (KCAHW), a Perceived Self-Efficacy and Autism Questionnaire and the Clinical Behavior Patterns Questionnaire were administered, along with a survey to assess participants’ level of satisfaction.

Results: After the model implementation, a significant increase was observed between pre- and post-test in the three areas. As for the knowledge level, the mean score of correct answers in the KCAHW was 12.21 ($\pm$ 2.09) in the pre-test, and 16.28 ($\pm$ 1.89) in the post-test, out of a total of 19. The perceived self-efficacy, with an initial total score of 2135 (59%), increased to 2606 (72%), reflecting an improvement of 13%. As for the practice patterns, 92.11% reported experiencing modifications, 85% stated that their practice competencies became adequate or very good, and 79.9% informed the clinics improved their ability to care for autistic people. Furthermore, the participants’ average level of satisfaction was over 80% for all the clinics.

Conclusions: The results suggest that the ECHO Autism program improved access to best-practice care training for clinicians in under-resourced areas of Argentina. Its implementation seems to have improved the participant’s knowledge levels, perceived self-efficacy, and practice patterns. Although much research is still needed, these results seem consistent with previous findings (Mazurek et al., 2017; Mazurek et al., 2020; Sohl, Mazurek, & Brown, 2017).

**406.387 (Poster)** Impacts of the COVID-19 Pandemic on Adaptive Functioning and Behavioral Problems Among Preschool Children with ASD: A Pre-Post Study


Background: Public health measures initiated in the Spring of 2020 to control the spread of SARS-CoV-2 disrupted many aspects of child and family life. Cross-sectional surveys have found children with autism spectrum disorder (ASD) experienced significant disruptions to
their therapies, school, and daily routines. Some studies have reported evidence of both positive and negative impacts of the pandemic on the functioning and behavior of children with ASD as perceived by parents. To our knowledge, no longitudinal studies of children with ASD compare standardized measures of adaptive functioning and emotional and behavioral problems obtained shortly before the pandemic to those re-administered during the pandemic.

Objectives: To investigate changes in adaptive functioning (as measured by the Vineland Adaptive Behavior Scales; VABS) and behavioral problems (as measured by the Child Behavior Checklist; CBCL) for children with ASD using measurements obtained prior to and during the COVID-19 pandemic and associated service disruptions.

Methods: Study participants included 274 children with ASD enrolled in the Study to Explore Early Development (SEED), a multi-site case-control study of preschool-aged children within six communities in the United States. ASD determination was based on the Autism Diagnostic Interview-Revised (ADI-R) and Autism Diagnostic Observation Schedule (ADOS). Between September 2017 and March 2020, parent-reported measures of adaptive functioning and behavioral problems were obtained using the VABS and CBCL, respectively, and served as pre-pandemic baseline measurements. Repeat VABS and CBCL measures, as well as a parent questionnaire on impacts of the pandemic, were obtained between January and July 2021. Multivariable linear regression models were created for each of the VABS domains and CBCL scores measured to assess pre-post differences adjusting for covariates.

Results: The impact of the pandemic on adaptive functioning scores varied by sub-domain, with statistically significant increases in Daily Living (5.5, 95% CI: 4.1, 6.9) and Socialization (2.3, 95% CI: 1.1, 3.5) and decreases in Communication (-4.2, 95% CI: -5.5, -2.9) domain scores. Adjusted linear regression models showed significantly lower mean composite VABS scores for those who reported losing specialty services (70.7, 95% CI: 68.9, 72.5) compared to those who did not (74.6, 95% CI: 71.9, 77.3). Mean CBCL scores decreased (Total Problems score difference -3.2, 95% CI: -4.2, -2.1), indicating a decline in behavioral problems during the pandemic. After adjustment, we found those who received telehealth services during the pandemic had a greater decline in behavioral problems compared (59.4, 95% CI: 57.3, 61.4) to those who did not (61.8, 95% CI: 59.5, 64.2).

Conclusions: Understanding the impacts of the COVID-19 pandemic and associated disruptions in access to services on communication and other domains of adaptive functioning and emotional and behavioral problems in children with ASD is essential to allow preparedness for future public health emergencies and limit service disruptions. For young children with ASD, these disruptions may be especially detrimental given the importance and benefits of early interventions and treatments. However, more time at home with caregivers may also result in increased application of daily living and social interaction skills, or increased recognition of these skills by caregivers.

406.388 (Poster) Implementation and Efficacy of Stress-Reduction Interventions for Parents of Preschoolers with ASD across in-Person and Virtual Modalities
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Background: Parents of children with autism spectrum disorder (ASD) experience heightened parenting stress (e.g., Hayes & Watson, 2013) and challenges are exacerbated for underrepresented families. High levels of parenting stress have been associated with negative consequences for parent mental and physical health (e.g., Allik et al., 2006; Rao & Beidel, 2009), and elevated levels of child behavior problems in youth with ASD (Rodriguez et al., 2019). Nevertheless, parenting stress has rarely been addressed directly in interventions for families of children with ASD, and even less so in underserved populations where clinical needs are greater.

Objectives: Utilizing data from a randomized controlled trial (RCT), we evaluated feasibility, acceptability, and efficacy of Mindfulness-Based Stress Reduction (MBSR) relative to Psychoeducational Support (PE) for parents of preschoolers with ASD. We also compared metrics for in-person and virtual modalities following our pivot to telepsychology in response to COVID-19.

Methods: Participants included 117 diverse parents of preschoolers with ASD (ages 3-5 years, 78.63% racial/ethnic minority) who were part of the Stress-reduction Techniques for Enhancing Parenting Skills (STEPS) Project, an NIH-funded RCT. Parents were randomly assigned to receive the MBSR (N=59) intervention or the PE active comparator (N=58). Parents and their children with ASD participated in assessments at baseline, immediately post-intervention, as well as 6- and 12-months post-intervention. Interventions were delivered in-person (MBSR-IP=32, PE=34) or online (MBSR-VT=27, PE-VT=24). The primary outcome, parenting stress, was a latent variable comprised of three measures; the Parental Distress subscale of the Parenting Stress Index-Fourth Edition, Short Form (PSI4-SF; Abidin, 1995), the Negative Impact scale of the Family Impact Questionnaire (FIQ; Donenberg & Baker, 1993), and the Intensity subscale of the Parenting Daily Hassles questionnaire (PDH; Crnic & Greenberg, 1990).

Results: There were no significant differences by intervention group or modality in baseline variables or in rates of attrition. Most parents who participated in treatment attended at least half the sessions (MBSR-IP=69%, MBSR-VT=92%, PE-IP=82%, PE-VT=100%) and attendance was significantly better virtually than in-person (MBSR r=2.40, p<.05; PE r=3.84, p<.001). Parents recommended/strongly recommended the program (96.6%); there were no satisfaction differences by intervention type or modality.
Intention-to-treat analyses using a two-level linear growth curve model with latent outcomes tested whether parenting stress decreased over time and whether rate of change differed by intervention type or modality. Parenting stress decreased significantly for both groups ($\gamma_{11}=$ -2.448, $p<.001$), but MBSR resulted in greater stress reduction than did PE ($\gamma_{11}=-2.243$, $p<.05$). Subsequent models testing the interaction between intervention modality and change in parenting stress over time, as well as a three-way interaction between intervention type, modality, and change in parenting stress over time were non-significant indicating that change in parenting stress did not depend on modality, nor did it depend on the interaction between intervention type and modality.

Conclusions: Our RCT revealed the feasibility, acceptability, and efficacy of MBSR for addressing a critical clinical need in underrepresented families of young children with ASD. Evidence of improved attendance and similar efficacy of virtual delivery underscores the potential viability and utility of this modality for outreach to underserved families.

406.389 (Poster) Advancing Access to Best Practice Care in Latin America: Implementation of the Extension for Community Healthcare Outcomes (ECHO) Autism Model to Equip Clinicians with Evidence-Based Knowledge and Training

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Background: As part of a multi-country effort, Paula and colleagues (2020) identified issues faced by families affected by ASD throughout Latin American countries, where long wait lists were identified as one of the most prevalent concerns. The current project was developed to test an innovative model for training community clinicians in best-practice care for ASD using the Extension for Community Healthcare Outcomes (ECHO) framework. Three different sites in Argentina and Chile launched their ECHO Autism programs between 2020 and 2021, focusing on screening and identification of ASD and developmental differences and management of co-occurring conditions.

Objectives: To determine feasibility of the ECHO Autism model within Latin American populations. This paper shares the experience of three ECHO Autism replication programs and their impact on community clinicians throughout the region.

Methods: Each ECHO Autism program ran in cohorts of 8 sessions per year. Sessions occurred once per month for 90 minutes, where community clinicians presented de-identified cases to an ECHO Autism expert hub team for feedback and guidance, followed by a brief didactic presentation to address specific knowledge gaps. Participants joined each ECHO Autism program from all over the hub-team country, as well as neighboring countries. Pre- and post-surveys were sent to the participants. ECHO Autism: PROTECTEA started in March 2020, with two cohorts now completed and analyzed. ECHO Autism: Neurodiversidad and ECHO Apoyo Autismo Chile started in 2021 and the data represent the results of their first cohort.

Results: ECHO Autism: PROTECTEA (Buenos Aires, Argentina) averaged 115 clinicians per session, from 58 centers across the country in addition to centers in Chile, Ecuador, and Peru. Results showed statistically significant increases in the use of standardized screening or formal testing after participation in the program (from 50% of clinicians using no assessment tools or simple clinical observation, to almost 90% of participants reporting use of standardized testing and screening measures post-ECHO Autism program). ECHO Autism: Neurodiversidad (Santa Fe, Argentina) averaged 30 clinicians per session. Results showed that participants showed great improvements in measured knowledge of autism, with an average score of 12.21 ± 2.09 in the presurvey and an average score of 16.28 ± 1.89 in the post-survey score ($t(29)=2.04; p=0.00$), as well as increases in self-efficacy, rating themselves as feeling $3=\text{a little confident} (32\%)$ and $4=\text{confident} (39\%)$ at first; while, in the post-test, the most significant response was $5=\text{very confident} (51\%)$. ECHO Apoyo Autismo Chile (Chile) averaged 30 participants per session. Participants rated their satisfaction and applicability of the information received as very high, with most respondents falling in the $4=\text{applicable} (35\%)$ or $5=\text{very applicable} (54\%)$ range.

Conclusions: The ECHO Autism model has demonstrated to be an effective model to approach autism care and address one of the main barriers identified by families, namely prompt access to assessment and best-practice care in under resourced areas of Latin America. The results of these programs suggest that it can be an effective model for advancing access to evidence-based knowledge, and thus increase access to best-practice care in low resource communities.

406.390 (Poster) Addressing Gaps in Care through the Extension for Community Healthcare Outcomes (ECHO) Autism: Psychology Program in Missouri and Beyond

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Background: In recent decades we have seen a global rise in the prevalence of autism spectrum disorders (ASD), with an insufficient number of professionals trained to meet this demand. The combination of complex assessments, along with a rise in the prevalence of ASD,
has led to significantly long wait times for diagnostic evaluations. In addition, people with autism and their families are often left without the follow-up care needed to address their ongoing needs. The ECHO Autism: Psychology Program was developed in Missouri in 2018 to address these gaps, training and supporting community-based psychologists to provide best-practice autism diagnostic evaluations and follow-up care. This model was replicated in Argentina, training and supporting clinicians and psychologists in advanced diagnostic practices using best-practice guidelines.

Objectives: Increase capacity of clinicians in underserved areas who can provide high-quality, best-practice autism evaluations for patients of all ages by bolstering clinician self-efficacy to utilize gold-standard tools.

Methods: Community clinicians (i.e., psychologists, physicians) who participate in the program complete a three-day Autism Diagnostic Observation Schedule–Second Edition (ADOS-2) clinical training before they participate in 90-minute ECHO Autism virtual sessions held twice monthly. Sessions include a de-identified case-presentation by one program participant, which leads to a rich case discussion and a brief didactic that reinforces specific knowledge (e.g., diagnostic interviewing skills, differential diagnosis, management of co-occurring conditions, etc.). After demonstrating an increase in knowledge and self-efficacy across 31 participants in the US, the model was replicated in Argentina with adaptations due to funding limitations, including hosting sessions monthly and being unable to provide ADOS-2 clinical training. Sessions continued to follow the ECHO Autism: Psychology model as described above.

Pre- and post-surveys were completed by participants in the US and Argentina to rate their confidence in understanding, detecting, and diagnosing ASD. Measures such as location, years in practice, number of people with autism seen in their practice, knowledge, and self-efficacy in diagnosing and providing follow-up care were gathered to determine program effectiveness.

Results: The flagship program in Missouri recruited psychologists across the state, with a focus on underserved areas. Program participants joined from 18 different counties, with 65% of the psychologists in Missouri within 30 miles of an ECHO Autism trained primary care clinician (Figure 1). Results showed 25% growth rate across all domains of self-efficacy measured, with the most significant growth in ADOS-2 administration, coding, and interpretation (136% growth rate). The ECHO Autism: PROTECTEA program in Argentina averaged 115 clinicians per session, from 58 centers across the country (Figure 2). Analysis of pre-post surveys showed significant increases in the use of standardized screening or formal testing, from 50% of clinicians using simple clinical observation, to almost 90% reporting use of standardized testing and screening measures at post.

Conclusions: ECHO Autism: Psychology is an effective program that has demonstrated successful replication, increasing best-practice autism care in low resource areas in the US and beyond. In both the US and Argentina, clinicians find the sessions highly valuable, with increases in self-efficacy, knowledge, and development of referral networks to support their practices.

Background: Health care transition (HCT) services help adolescents prepare for a smooth transition to adult care, ensure insurance retention, and promote adolescents’ independent management of their health care and life needs. Lack of HCT services can result in negative outcomes such as unmet needs, over-medicated, and loss of decision-making authority. Less than 15% of autistic young adults receive HCT services. This is a significant disparity compared to young adults with other special health care needs. Further, HCT readiness assessments are a part of HCT services but there are no self-reported HCT readiness measures that address the unique needs of the autistic young adult population.

Objectives: This study used a mixed-methods approach to develop a holistic self-reported measure of HCT readiness for autistic young adults called the Health-Related Independence Self-Report (HRI-SR).

Methods: A previously developed caregiver-reported Health-Related Independence (HRI-CR) measure was revised based on a two-step data collection process with autistic young adults. First, autistic young adults took part in individual interviews to assess the constructs and sub-topics included in the HRI-CR. Cognitive interviews were then conducted to assess the survey structure, question-wording, and online usability. Both individual and cognitive interviews were conducted until data saturation was identified. A validation study comparing the HRI-SR to the gold standard (STARx) and other validated measures is underway (completion date March 2023).
Results: The analysis of the individual interviews (n=5) identified high needs for HCT services and a desire for an HCT readiness measure that young adults could complete independently or with minimal support. All six constructs within the HRI-CR measure were highly rated by all participants. The highest-ranked constructs were 1) Knowledge of Physical and Mental Health Conditions, 2) Medication and Illness Management, and 3) Safety. Major themes within the qualitative data included: reliance on caregiver assistance, desire for independence with some support, lack of provider engagement, and need for skills to fully participate in a health care clinic visit.

Similarly, autistic young adults participating in the cognitive interviews (n=10) endorsed all six of the constructs currently included in the HRI-SR measure. Participants provided extensive feedback on how questions and answer choices should be worded. Participants also discussed how they thought about each question and how they picked an answer. This information was used to make terms and descriptions more concrete and improve the clarity and readability of questions. Member checking was used to ensure the accuracy of results and measurement changes.

Conclusions: The development of the HRI-SR measure was a comprehensive and iterative process utilizing the lived experiences of stakeholders. Autistic young adults were very supportive of the development of this and additional self-reported measures. Autistic young adults identified themes that can help enhance healthcare provider engagement, promote independence, and improve the frequency and quality of HCT services provided.

426.347 (Poster) Indigenous Autism in Canada: A Scoping Review

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Background: Autism spectrum disorder (ASD) is characterized by difficulties with communication, differences in social communication, as well as restricted repetitive behaviors and interests. It is widely recognized that ASD occurs in all populations, including Indigenous populations. The prevalence of ASD in Indigenous communities is currently unknown and there is minimal academic literature on lived experience related to ASD in cultural contexts.

Objectives: Our goal was to scan all the academic and grey literature as it pertains to ASD and Indigenous peoples in Canada. Our aim was to capture what is conveyed in the literature as it pertains to the following research questions: Overall, what is known about ASD in Indigenous communities in Canada?; what are the experiences of ASD in Indigenous communities across Canada?; what research has been conducted on the prevalence of ASD in Indigenous communities in Canada?; What supports for ASD are offered in Indigenous communities in Canada?

Methods: We conducted a scoping review to capture the breadth and nature of the literature on ASD and Indigenous communities in Canada. Scoping reviews are used to identify the types of available evidence in each field; to examine how research is conducted on a certain topic or field; to identify and analyze knowledge gaps. In this review, we collaboratively defined concepts and outcomes in an iterative fashion to ensure comprehensive inclusion and relevance of the literature reviewed. We further applied Harfield’s Indigenous Quality Appraisal Tool (QAT) to all original research articles to assess quality of health information from an Indigenous perspective. Finally, we brought the review to the Autism Society of Alberta (Canada) Indigenous Relations Circle and asked them to provide feedback which included perspectives of Indigenous autistics, Indigenous caregivers, and non-Indigenous service providers.

Results: The initial database search yielded 207 articles, and after removing 128 duplicates, 84 articles remained. Two authors independently screened out 50 articles. From the 34 remaining sources, the authors excluded 10 through full-text review as they did not meet the inclusion criteria. Thus, a total of 24 articles met inclusion criteria for this scoping review. The main finding was the lack of literature as it pertains to ASD in Indigenous communities and how the lack of evidence is a main concern of those who work in this field. Other identified themes included the need for more Indigenous-led primary research, routine misdiagnosis of Fetal Alcohol Spectrum Disorder (FASD), lack of funding and resources, and the problematic use of the deficit oriented medical model. Most articles also scored better on the QAT and the ones that scored better were written within the past 5 years and had substantial Indigenous input.

Conclusions: This scoping review indicates the critical need for research that is focussed on autism and Indigenous peoples in Canada. The literature that does exist does not adequately provide a picture of that realities of autism in Indigenous communities. Finally, the review showed that the lack of Indigenous led research on autism is an urgent priority for Indigenous communities and families in Canada.

426.348 (Poster) Intervention Plan Quality Matters: Providing Feedback on Planned Adaptations for Personalized Evidence-Based Practices in Compass

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Background:

Developing high quality educational programming individualized to the social emotional learning (SEL) needs of students with autism remains a challenge for teachers despite the widespread dissemination of evidence-based practices (EBPs) (Odom et al., 2022). COMPASS supports teachers and caregivers in identifying SEL goals and developing intervention plans using EBPs individualized to the student’s personal/environmental strengths and challenges with teacher and caregiver input (Ruble et al., 2022). This study comes from a larger study of developing and testing a training package for COMPASS (Ogle et al., 2022; Ruble et al., 2022) and focuses on an area where trainees faced the most difficulty - developing high quality intervention plans.

Objectives:

To improve the fidelity of intervention plans developed in COMPASS, the Intervention Plan Quality Scale (IPQS) was developed and validated with other fidelity measures to provide consistent, targeted feedback to consultant trainees (CTs).

Methods:

Participants included nine school based CTs who each implemented COMPASS to up to four different students with autism (n = 28) in collaboration with the student’s special education teacher (n = 28) and caregiver (n = 28) for a total of 93 participants. All students were diagnosed with autism and receiving special education services under the category of autism. All CTs were White women (M = 37 years old, SD = 7.96) who had an average of 10 years (SD = 6.31) consultation experience. The Intervention Plan Quality Scale (IPQS), a 16-item yes-no checklist completed by the researchers and CTs, was developed and tested to assess the evidence-based principles of a high-quality intervention plan (e.g., SMART goals, teaching sequence utilizing EBPs, plans for generalization). Criterion validity of the IPQS was established with other measures of COMPASS fidelity including a measure of the CT’s adherence (25-items, yes-no, KR-20 = 0.72) and quality of delivery (27-item, yes-no, KR-20 = 0.86) in implementing the consultation, as well as the teacher’s adherence to the intervention plan (0-4 scale, 4 = 76-100% elements observed).

Results:

The IPQS had acceptable reliability (KR-20 = .72) and interrater reliability (percent agreement = 94%). The percentage of elements identified from the IPQS averaged 52% for their first consultation and reached 75% by the fourth. Unlike the other skill domains that required one session to achieve adequate fidelity, four sessions were required for intervention plan development. Further, there was a significant difference in researcher (M = 62.51, SD = 18.35) vs. consultant self-report (M = 77.88, SD = 13.043) ratings of the IPQS; t (23) = 4.99, p = .001. This difference was highest the first feedback sessions (28%) but decreased to a 2% difference by the fourth session. Scores from the IPQS were positively correlated with the consultant’s adherence to the COMPASS consultation protocol, quality of delivery, and teacher adherence to the intervention plans at the final coaching session (see Table 1).

Conclusions:

The IPQS shows promise as measure of high-quality intervention plans in COMPASS as it demonstrates acceptable reliability and validity. Further, the IPQS may be helpful for dissemination efforts more broadly.

426.349 (Poster) Investigating South African Practitioners’ Educational Practices and Knowledge of Early Childhood Development in Children Aged 3 Months to 2 Years

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Background: Olusanya et al., (2016) estimated that 95% of children worldwide who present with some type of disability, including autism, live in low- and middle-income countries. Whitehouse et al. (2021) showed that preventative interventions strategies implemented by caregivers with children younger than 1 year old of age reduced the rate of expected autism diagnosis. In low- and middle-income countries, it is common for infants to spend most of their waking time in daycare centers (Gromanda et al., 2020). Thus, it is important for daycare educators to identify children at risk of developmental disabilities and to promote a context that fosters infants’ milestone development.

Objectives: The objective of this project was to conduct a training needs assessment for educators caring for children between the ages of 3 months to 2 years from low- to middle-income areas in the Cape Town, South Africa. Specifically, we aimed to identify educators’ knowledge and level of confidence in describing young children developmental milestones and age-appropriate activities in daycare centers.
Methods: We utilized a mixed methods approach to identify educators’ knowledge of early childhood developmental milestones and educational activities. First, we conducted an online survey (adapted from Banerjee & Luckner, 2013) containing questions related to educators’ demographic information, knowledge of young children’s developmental milestones and age-appropriate activities. Next, we conducted a face-to-face interview to draw on participants’ in-depth experiences and their subjective accounts on the topic. A total of 253 early-childhood educators from various childcare facilities from low- to middle-income areas in Cape Town completed the online survey. From this sample, 45 participants completed the interview. Sample sizes were determined by the broader integrative perspective which balances the qualitative consideration of favoring a small sample (N= 45-50; Dworkin, 2012) for conducting in-depth qualitative analysis, against that of quantitative considerations of generalizing from a larger sample (N= 251; Creswell, 2017). We analyzed survey data using descriptive statistics such as measures of central tendency (e.g. mean, median), and interview data using Braun and Clark’s (2006, 2013) six steps of thematic analysis.

Results: Data collected from both the survey and interview showed the majority of participants working directly with young children have little to no confidence in listing the developmental milestones and describing classroom strategies to promote these milestones. The qualitative analysis revealed four related themes: (a) Educators’ knowledge of developmental milestones; (b) educators’ perceived skills of an effective educator; (c) strategies employed to foster children’s development; and (d) perceived characteristics of a healthy educational environment for child development.

Conclusions: The lack of knowledge of developmental milestones and age-appropriate educational activities might negatively impact the rate by which young children at risk of autism are referred for evaluation and specialized services. Of great importance is the development of training programs which prepare educators to identify developmental delays and promote an educational environment that is rich and stimulating. Based on these results, we plan to develop a training program to prepare early childhood educators to recognize expected children’s developmental milestones and to implement age-appropriate activities in the classroom.

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Background: The COVID-19 pandemic and the resultant lockdown forced autism services, including parent-mediated interventions (PMIs) to pivot to an online mode globally. In India, during the first year of lockdown, we piloted an online version of UPPA- a culturally adapted version of Project ImPACT (Ingersoll & Dvortcsak, 2010) which is an evidence-based, parent-mediated naturalistic-developmental behavioral intervention model. Initial data revealed satisfactory levels of feasibility and acceptability as the synchronous-online model increased accessibility for those in remote locations and with caregiving responsibilities at home. However, lack of face-to-face contact and technological issues impeding facilitatory coaching by the therapists led to parental recommendations for a blended model. As the lockdown eased, we implemented a hybrid group model of Project ImPACT. Providers who conduct the PMI have had to customize to novel delivery modes with their inherent strengths and challenges.

Objectives: To report on providers’ perspectives of the acceptability and feasibility of a hybrid mode of delivery of Project ImPACT in community settings. Methods: A hybrid model was utilized to deliver Project ImPACT, which included twelve group sessions (1.5 hours) delivered online on Zoom and six individualized parental coaching sessions (1 hour each), which parents could opt for either remotely or in person at our clinic in ... over a duration of 6 weeks. Six providers with clinical experience ranging from 3-7 years and prior experience in delivering the PMI conducted the group and individualized coaching sessions with the families. Qualitative data was collected from the providers (n=6) and supervisors (n=2) through in-depth interviews conducted by a trained interviewer, using an interview guide with open-ended questions about the process of delivery of the PMI. Audio recordings were transcribed, all data was coded using principles of thematic analysis, and themes were identified inductively.

Results: Between January 2021 to October 2022, a total of caregivers of 96 children (age 2-6 years) participated across six cohorts of the PMI, including both online (n=41) and in-person center-based coaching sessions (n=39), with a drop-out rate of 15.7%. The themes identified included Increased satisfaction due to Greater Access to care for Families (in under-resourced areas, ease and flexibility of access with lesser need for childcare, more family members could attend) and Greater Connection with children and families (during in-person coaching sessions). Themes also highlighted challenges around Frustration with Increased Drop-out and Feelings of Disengagement with Parents (engagement in online group sessions perceived as low as compared to in-person or completely online models). Additionally, data from supervisors revealed Logistical Challenges and Resource Allocation as difficulties, with the need to manage both online and in-person services simultaneously and synchronously.

Conclusions: Though promising, the hybrid delivery mode has its challenges. While some barriers were specific to the post-pandemic reopening phase, others are more systemic and will need to be addressed to make this model feasible and sustainable for both care recipients and care providers. Future directions of study include caregiver perspectives of hybrid care models and examining clinical outcomes for children to explore effectiveness.

426.351 (Poster) It’s Time to Improve and Systematize How We Document Autism Care in Our Medical Records. 
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Background: The electronic health record (EHR) system has vast potential in service use tracking, care coordination, and population-based research for children with autism. However, research on the reliability and validity of EHR documentation for autism diagnosis and care is scarce.

Objectives: To investigate the reliability of diagnostic and service documentation within one healthcare system and, for variables with high reliability, examine potential disparities in care.

Methods: Participants were drawn from a cohort who received at least one well-child primary care visit between 16 and 26 months of age across our pediatric health system between 2011 and 2019 (n=23,015). Children were considered to have autism if the diagnosis appeared more than once in their EHR (i.e. in a visit diagnosis or problem list) or was made by an autism specialist. Of the 731 children with autism, 217 were randomly selected for further review.

Manual chart reviews identified any reference to referrals, diagnoses, or interventions (both general and autism-specific) from encounter notes, direct evaluation reports, or scanned external documents. If dates were not explicitly reported, they were estimated with consensus from the study team. Each chart review took at least 30 minutes. The presence of documentation and dates were compared across sex, race, insurance type, and diagnostic provider using chi-square tests. Inter-rater reliability (IR) analyses were performed on 31 records with IRs for dates calculated within a 3-month window. Data that was both present and reliable (>80%) was further analyzed and compared across similar subgroups.

Results: Documentation was both highly present and highly reliable (>90%) for general intervention referrals and autism diagnoses including diagnostic provider and diagnostic measures used (Table 1). Documentation that general intervention was received also frequently present (95.4%). Type of general intervention received and date of autism diagnosis had relatively high IR (83.9% for both).

Experiencing variables that were both highly present and highly reliable, we found that most children received some type of general intervention prior to their autism diagnosis (Table 2). Those who received county-provided Early Intervention prior to their autism diagnosis also received an earlier diagnosis (p=0.029). However, Black and Medicaid covered children were less likely to have received general interventions before a diagnosis (p=0.039 for both) or to receive their diagnosis from a developmental behavioral pediatrician (p=0.014 and 0.010, respectively). Additional differences in care by provider type and patient demographics will be discussed.

Conclusions: Autism diagnoses and general intervention services could be located with time-intensive manual chart review. Unfortunately, documentation on type and timing of autism-specific services was very limited. Systematizing basic autism documentation presents an extraordinary opportunity to improve individual care coordination, implement quality improvement initiatives, and conduct population-level research on early diagnosis, intervention, and disparities.

426.352 (Poster) Learning Social Skills Online and on the Spectrum: Evidence from the Telehealth Adaptation of PEERS® for Young Adults

Background: Autistic young adults exhibit differences in social communication (APA, 2013), which can contribute to social isolation, loneliness, and mental health symptomatology (Orsmond et al., 2013; Schiltz et al., 2021). Effective social skills interventions are essential to mitigating these negative sequelae and empowering autistic people to achieve their social goals. As one of the only evidence-based social skills treatments for this population, PEERS® for Young Adults (Laugeson et al., 2012; McVey et al., 2016) meets a critical need and has been adapted for telehealth in response to the COVID-19 pandemic. Though evidence suggests that outcomes following other PEERS® programs are similar across in-person and telehealth modalities (Estabillo et al., 2022), the effectiveness of telehealth implementation of PEERS® for Young Adults has not yet been empirically established. To do so is essential given indications that telehealth activities are here to stay (Bestsennyy et al., 2021; Dorn, 2021).

Objectives: This paper aims to examine effectiveness of PEERS® for Young Adults implemented via telehealth and to compare treatment response to the original in-person modality.
Methods: Participants included 58 autistic young adults \( (M_{age}=21.97, SD=4.32) \) who completed PEERS® for Young Adults via telehealth between 2020 and 2022 and a comparison pre-pandemic group of 89 autistic young adults \( (M_{age}=23.09, SD=4.74) \). PEERS® for Young Adults is a 16-week caregiver-assisted curriculum that teaches skills related to friendships, handling conflict, and dating etiquette. Young adults and their caregivers completed measures of social functioning pre- and post-intervention, including the: Social Responsiveness Scale, 2nd Edition (SRS-2; Constantino & Gruber, 2012), Social Skills Improvement System (SSIS; Gresham & Elliott, 2008), Empathy Quotient (EQ; Baron-Cohen & Wheelwright, 2004), Social Anxiety Scale (SAS; La Greca, 1998), Social Emotional Loneliness Scale for Adults (SELSA; DiTommaso & Spinner, 1993), and the Test of Young Adult Social Skills (TYASSK; Laugeson, 2015).

Results: Following PEERS® for Young Adults via telehealth, young adults significantly improved on all outcomes, \( ps<.05 \). When comparing baseline differences between telehealth and in-person groups, young adults in the telehealth group were rated as having significantly higher social skills on the SSIS at baseline, \( p=.003 \). Including baseline SSIS Social Skills as a covariate, two MANOVAs were conducted comparing in-person to telehealth outcomes for caregiver- and self-reported outcomes, respectively. No significant differences emerged on caregiver-reported outcomes, \( F(5,85)=0.41, p=.84 \). The MANOVA for self-reported outcomes was significant, \( F(4,81)=2.79, p=.032 \). Post-hoc analyses indicated that this effect was driven solely by differences on the TYASSK, \( p=.014 \), such that the in-person group showed greater increases in knowledge of the social skills taught in PEERS® \( (M_{change}=8.57) \) than the telehealth group \( (M_{change}=6.02) \).

Conclusions: Results indicate that telehealth PEERS® for Young Adults is an effective intervention for autistic adults. Slight benefits of in-person implementation on knowledge of the social skills taught in PEERS® may be due to unique distractions present on telehealth (e.g., adequate internet access, family members in home, administration location) interfering with encoding and recall. Overall, these findings lay a strong foundation for continued telehealth implementation, expanding accessibility of evidence-based social skills treatment and reducing barriers impacting service access and utilization.

426.353 (Poster) Making Feedback Feasible: Improving the Efficiency of Performance Feedback of Compass Trainers

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Background:

Depending availability of accessible evidence-based practices (EBPs) in autism, a research-to-practice gap persists (Knight et al., 2019). Implementing EBPs in community settings has been hindered by the absence of frameworks for effective intervention implementation that maintains fidelity. The Replicating Effective Programs (REP) framework addresses this research-to-practice gap by outlining mechanisms (i.e., training and package refinement as a component to maintenance and evolution) for feasibility packaging interventions for community-based settings without compromising effectiveness (Kilbourne et al., 2007).

The COMPASS is an evidence-based consultation and teacher coaching intervention that has been successfully implemented by community-based consultants (Ruble et al., 2022). For COMPASS to be disseminated beyond the developers, critical elements (e.g., fidelity assessment/feedback) must be able to be transferred feasibly to schools with limited resources.

Objectives:

Using the REP framework, we will describe a process for increasing the feasibility of fidelity feedback to consultant trainees (CTs) in community settings.

Methods:

To ensure implementation fidelity for COMPASS, trainers prepared feedback sessions by reviewing a three-hour audio recording of the initial consultation. Recognizing the need for feasible feedback and training for future dissemination, we applied an iterative data-driven, two-phase refinement process to reduce the amount of time required while maintaining COMPASS fidelity.

Original Measures. Consultant adherence to the COMPASS protocol was evaluated using a 25-item, yes-no checklist. Assessment of intervention plan adherence included a 16-item, yes-no checklist following the consultation that evaluated CT adherence to the evidenced-based principles for intervention plan development. To appraise the quality of delivery, initial consultation process skills were assessed using a 35-item yes-no checklist gauging communicative skills across the consultation.

Phase I: Initial Assessment Using Time-Sampling Procedure. Timestamps for content review of audiotapes were selected for the COMPASS introduction/closing, and development of the social goal and intervention plan. The written intervention plan and a 30-minute sample of a COMPASS consultation audio recording were rated for fidelity using the original measures. Interrater reliability between RAs and the primary coder was calculated. Rating differences necessitated further item clarifications and elimination of redundancies in items across the measures.
Phase II. Refinement and Testing of Fidelity Measures. After refining the feedback process, the primary rater and RAs evaluated the 30-min audio sample and intervention plan using the abridged fidelity measures from Phase I. Measures refinement continued until attaining 80% interrater reliability.

Results:

The refinement process reduced the measures by 56.0% for consultation adherence and 65.7% for process skills. The amount of audio that the trainer had to evaluate was reduced by 80%, from 3 hours to 30 min. Final interrater agreements for measures of adherence, intervention plan quality, and process skills were 97.0%, 90.2%, and 94.0%, respectively. Most importantly, agreement between the original and abridged measures of adherence, intervention plan quality, and process skills were 89.7%, 81.8%, and 83.3%, respectively

Conclusions:

Findings suggest the time-sampling procedure and abridged fidelity protocol can reliably capture COMPASS fidelity that maintains fidelity captured by original and time-consuming assessment. Feasible and effective feedback is essential for the future maintenance and evolution of COMPASS in schools.

426.354 (Poster) Maximizing Clinical Data Utility: Parent and Clinician Preferences for Caregiver-Reported Data Collection and Access

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Background:

Academic health professionals participating in learning health networks collect data for research to inform clinical decision-making and for Quality Improvement (QI). While clinical data is collected as part of routine care, caregiver or patient-reported outcome (PRO) data are critically important for understanding the priorities and needs of the patient and family. PRO data are typically not part of the clinical care process and alternate collection methods are often needed. The Autism Care Network (ACNet), an autism learning health network, supports a large patient registry which includes PRO data provided by caregivers. An understanding of the priorities of patient registry consumers (clinicians, researchers, and patients / families) is needed to create a data system that ideally meets their needs and can support QI to improve patient outcomes.

Objectives:

To optimize collection and use of PRO data in order to improve a) clinician decision-making, b) symptom monitoring, and c) population level care practices and research.

Methods:

Surveys were completed by 93 caregivers and 167 clinician/researchers participating in ACNet to better understand current use of PRO data and priorities. Survey content was developed by a workgroup of network leadership, family partners and two data analysts with expertise in survey design. Clinician survey questions addressed the scope of data collected, demographics, experience with current registry data, and factors to increase future use of registry data. Caregiver surveys were similar with revised demographic questions and emphasis on use of their family member’s health information. Surveys were disseminated by email to all network clinicians and members of site family partner committees. One-on-one interviews of select clinicians and parents were conducted for more detailed feedback.

Results:

60% of caregivers reported having received behavioral data from their health provider in the past. 90% of caregivers felt that behavior data would help them understand their child’s behavior, 88% felt data would help with medication decisions, and 97% felt data would be helpful in assessing efficacy of behavioral interventions.

Among data access options, 72% of caregivers preferred an online portal while 59% prefer their autism care provider’s electronic medical record. Caregivers indicated willingness to complete surveys longitudinally regarding their children’s behavior, as long as the behavioral assessments correlated with their child’s specific areas of difficulty. Priorities for clinicians included easy access to the data (83.7%), a meaningful connection to clinical outcomes (80.7%), measures that can demonstrate change in symptoms over time (75.6%), and measures
that are easy for families to complete (80.0%). Both groups recommend addition of measures assessing parenting stress and social determinants of health.

Conclusions:

Consideration of end-user priorities can improve patient registry data collection, analysis and utilization. Families are more willing to participate if they can receive direct benefit by accessing their own data or clinicians use data to optimize clinical care. PRO data collection could be accelerated by providing clinicians access to data displayed in meaningful ways that aid in care decision making.

426.355  (Poster)  Mechanisms for National Change Towards Neurodiversity Affirming Practice in Health and Education Services in Scotland

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Background:

Implementing the changes we wish to see to improve the lives of autistic people and other neurominorities on a national level is extremely challenging. Neurodivergent people, including autistic people, often wait too long for assessment and receive inadequate support in educational and health settings. The National Autism Implementation Team (NAIT) was funded by the Scottish Government to establish a national quality improvement approach and performed against the backdrop of significant focus on autism and related needs, and strong messages from stakeholders on improvement requirements. The NAIT programme was designed to improve Scottish healthcare pathways and educational experiences, aiming to improve quality of life, participation and access to employment and education with a renewed focus on outcomes valued by autistic people. Clinicians, education professionals and researchers developed and led the programme, with active involvement of stakeholders, including Government representatives and people with lived experience. The work of NAIT has included a multi-year, multi-phase national programme of training, practice development, education, dissemination, and facilitation of change.

Objectives:

This conference presentation will report how the NAIT programme was planned, delivered, and received over four years, and provides an analysis of the ‘active ingredients’ of this complex intervention.

Methods:

Complex interventions research requires a pluralistic evidence base so multiple methods are required. An analysis was completed drawing on the Medical Research Council (MRC) Framework for developing and evaluating complex interventions and realist evaluation analytic methods. Data and analytic procedures included a review of programme documents, consultation with programme leaders, and consultation with professional stakeholders with a high degree of involvement in NAIT activities and change. The analysis led to the identification of a NAIT ‘programme theory’ expressed through a realist matrix of ‘contexts’ (C), ‘mechanisms’ (M), and ‘outcomes’ (O). Autistic people have been included in the development of the research and in the NAIT team.

Results:

NAIT principles towards facilitating neurodiversity affirming practice, activities, resources and key interventions were identified. Sixteen ‘context’ factors (factors which favour or disfavour the activation of mechanisms) were identified. Three clusters of ‘mechanisms’ (processes underpinning changes in outcomes or ‘active ingredients’ of the NAIT programme) were identified at Macro level (two mechanisms), Practitioner level (seven mechanisms) and Institutional level (four mechanisms). Seventeen outcome areas were identified. The role of NAIT is to provide support to enable practitioners across sectors to develop improved practices. This research was focused on national practice changes associated with NAIT, and to understand the impacts of NAIT in this ‘audience’ which is professional staff.

Conclusions:

The research has resulted in a clearer and more replicable programme theory that can be used by others with similar aims. This work illustrates the value of NAIT and realist methodologies as a tool for other policymakers, practitioners, and researchers.

426.356  (Poster)  Medical Staff Training for Hospitalized Patients with Autism Spectrum Disorder and Behavioral Health Needs

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Background: Estimates suggest children with Autism Spectrum Disorder (ASD) are six times more likely to be hospitalized for behavioral health needs (e.g., aggression, self-injury, and tantrums) and incur 12.4 times greater hospitalization costs than for typically-developing children. Further, children with ASD are at increased risk of restraint usage while hospitalized, and staff report lack of knowledge and comfort in caring for autistic patients. To address these needs, research on medical staff education is warranted. To date, some preliminary research exists on medical staff educational programs regarding ASD characteristics, behavior management strategies, and strategies for partnering with families. However, further development of an in-depth, cost-effective education curriculum that targets a variety of types of hospital staff members is needed.

Objectives: The purpose of this study was to 1) describe a medical staff education curriculum on caring for patients with ASD and behavioral health needs, and 2) evaluate effectiveness of the curriculum on increasing staff’s knowledge and confidence in providing care.

Methods: A team that included a pediatric psychologist, nurse educators and leaders, and neurodevelopmental disability residents designed a six-part, module-based training series. Module topics included: 1) ASD characteristics and family engagement, 2) risk factors for challenging behavior, 3) functions of behavior, 4) preventative measures, 5) calming techniques, and 6) a two-part, interactive case study. Pre- and post-survey questions and knowledge-based questions were embedded across modules and designed to assess changes in the knowledge and confidence of participants. The curriculum was introduced in a step-wise manner across hospital units and departments based on clinical need. All staff who completed the training were offered the option to consent for data use as part of the study.

Results: A total of 138 staff members consented to data use. Staff members included nurses, advanced practice providers, personal care assistants, sitters, and other ancillary staff (e.g., occupational therapists, speech-language therapists, social workers, child life specialists). The Wilcoxon signed rank test was used to compare participants’ ratings before and after completing the curriculum. All item scores increased significantly as a result of the intervention. See Table 1 for detailed scores.

Conclusions: This study describes an educational curriculum that was designed and implemented to increase the knowledge and confidence of medical staff members in providing care to patients with ASD and behavioral health needs. In particular, preliminary data suggest that interactive, module-based education about ASD, why challenging behavior occurs, and strategies for managing behavior can be effective in increasing knowledge and confidence of a wide variety of staff members in a comprehensive and cost-effective manner. In turn, this offers the potential for additional, long-term practice improvements. Currently, work on follow-up educational strategies continues at our organization to ensure maintenance of educational gains and translation to practice.

References:

1. Croen et al., 2006
2. O’Donoghue et al., 2020
3. Morris et al., 2019

426.357 (Poster) Moderating Effects of Family Income on the Relationship between Racial and Pragmatic Barriers to Treatment and Parental Stress  

Background: Historically, Black caregivers of autistic children face barriers when accessing treatment and diagnostic services (Pearson & Meadan, 2018). Prior research has illuminated the prominence of pragmatic (e.g., treatment cost, long waitlist) and racial barriers (e.g. racial microaggressions, autism stigma) Black caregivers experience as they navigate diagnostic and treatment services, with less research focusing on the impact of barriers experienced on caregiver stress (Broder-Fingert et al., 2020; Stahmer et al., 2019). Considering the pronounced intersection of poverty, equity, and its impact on youth mental health (Castro-Ramirez et al., 2021), it is important to understand how the relationship between barriers and parental stress is further impacted by family income among Black caregivers of autistic youth.

Objectives: The study was conducted to examine the relationship between practical barriers, racial barriers to treatment, and parental stress; and to investigate if caregiver income acts as a moderating variable in this relationship.

Methods: In this study, participants were a sample of Black caregivers of youth ages 0-21 years with ASD (N = 101). Bootstrap moderation analyses were used via PROCESS 4.0 in SPSS (Hayes, 2022) to examine if family income moderated the relationship between pragmatic barriers to treatment (measured by the Barriers to Treatment Participation Scale), racial barriers to treatment (measured by the Racial Barriers to Treatment Scale), and parental stress (measured by the Parental Stress Scale). Family income was fairly equally distributed among the participants.
Results: Individually, perceived pragmatic barriers to treatment predicted parental stress ($\beta = .2439$, $t(101) = 2.53$, $p = .001$). Similarly, perceived racial barriers to treatment predicted parental stress ($\beta = .2602$, $t(101) = 2.29$, $p = .025$). The results showed that family income did not significantly moderate the relationship between pragmatic barriers to treatment and parental stress. However, the results revealed that family income significantly moderated the relationship between racial barriers to treatment and parental stress ($\beta = -0.55$, $t(101) = -2.36$, $p = .021$). As racial barriers increased for families who earn $81,000-$100,000, parental stress remained unchanged; but as racial barriers increased in families who made less than $20,000, parental stress increased.

Conclusions: The results of the analysis suggest that caregivers who experience practical and racial barriers are more likely to experience parental stress. The relationship between racial barriers and parental stress may be less impactful for families with greater financial resources. This may be attributed to associations between income health literacy, and access to resources (Aylward et al., 2021). The results highlight the continued influence structural barriers have on maintaining disparities among Black families of autistic children. Further discussion and future directions will be presented on the poster.

426.358 (Poster) Neighborhood Deprivation Is Associated with Autism Symptom Severity and Internalizing Problems Among Youth with Autism

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Background: Children living in socioeconomically disadvantaged areas are less likely to be diagnosed with autism spectrum disorder (ASD) than those living in higher SES areas within the US. However, population-based studies in Sweden have found that lower SES is associated with an increased risk of ASD, suggesting that lower rates of diagnoses observed in the US may be attributable to barriers to accessing diagnostic evaluations. Additionally, research suggests that individuals with ASD are approximately four times more likely to experience depression compared to the general population and about 40% have had at least one comorbid anxiety disorder diagnosed. Evidence indicates that lower SES confers risk for internalizing problems, including anxiety and depression, among typically-developing children. However, the impact of socioeconomic disadvantage on symptoms of anxiety and depression among youth with ASD is less understood. Likewise, while there is some evidence to suggest that factors often associated with disadvantage including low parental education predict anxiety and depression in children with ASD, it appears other factors of impoverished communities such as employment, income, and housing quality have not yet been explored.

Objectives: The current study investigated whether living in a socioeconomic disadvantaged area is associated with ASD symptom severity and/or symptoms of anxiety and depression among youth with autism.

Methods: Participants included 7061 children with ASD aged 6 to 17 years (M=10.68, SD=3.28; 77% male) with available Area Deprivation Index (ADI) data from the Simons Powering Autism Research for Knowledge (SPARK) database. Autism symptom severity was assessed using the Social Communication Questionnaire (parent report). The Child Behavior Checklist (parent report) was used to assess symptoms of anxiety and depression. The ADI uses factors including income, education, employment, and housing quality to create nationwide percentile rankings of participants’ neighborhoods, where a neighborhood ranking of 1 indicates the lowest level of disadvantage and a ranking of 100 indicates the highest level.

Results: ADI was associated with autism symptom severity ($r=.12, p<.001$); children in areas of higher disadvantage also had greater levels of autism symptom severity. ADI also was associated with anxiety symptoms ($r=.08$) and depression symptoms ($r=.10$) among youth with autism ($p$’s<.001), such that children in more disadvantaged neighborhoods also experienced more symptoms of depression and anxiety.

Conclusions: The present study demonstrates that, like their typically-developing peers, youth with ASD living in neighborhoods characterized by greater levels of disadvantage are at elevated risk for experiencing anxiety and depression. As youth with ASD are already at heightened risk for internalizing outcomes, those with lower SES represent a uniquely vulnerable population. Further, neighborhood disadvantage was associated with increased autism severity, highlighting the importance of reducing barriers to accessing diagnostic services and intervention.

426.359 (Poster) Neurodiversity of the AIMS-2-Trials Research Network: Clinical and Self Diagnosis, Disclosure and Personal Links to Autism


Background:
Research teams need to reflect their surrounding society, and the proportion of autistic researchers in the autism research field has the potential of bridging science and communities. As a working example, we present the multi-national AIMS-2-TRIALS research network (aimed at biomarker discovery and interventions) - whose diversity has not yet been quantified.

Objectives:

For the first time, we seek quantitative insights in the representation of clinically/self-diagnosed autistic across researchers’ professional categories, personal links to autistic people, and whether diagnostic status impacts mental health.

Methods:

An online multiple-choice questionnaire set-up on Redcap was sent via internal newsletter, with 124 anonymised complete respondents across 14 countries. For selected variables (see Figure 1A; in bold, selected/aggregated variables/levels), we used (1) Fisher Exact tests to investigate associations between diagnostic status and seniority (advanced/mid vs early career, and advanced/mid vs early career vs support staff, whose odds ratio were calculated via logit binomial regression) (2) logit binomial regression to test the effect of having an autistic family member, autistic friends, other neurodevelopmental conditions and autistic acquaintances on diagnostic status (3) two-stage least square regression to test the effect of diagnostic status on mental health.

Results:

23% (29) responded that they are clinically/self-diagnosed (see Figure 1B) and 26% (32) that they have another neurodevelopmental condition. 35% (44) had an autistic family member, 68% (84) autistic friends and 90% (113) autistic acquaintances. 50% of the clinically diagnosed declared that they disclosed to their superior, while all self-diagnosed (24) did not declare whether they had.

Having a clinical/self-diagnosis was associated with being in early career, with higher odds compared to advanced/mid-career (OR = 4.48, 95% CI = 1.20-25.22, p-value = 0.01; Figure 2A). Further, clinical/self-diagnosis was associated with being support staff as compared to early, mid-advanced career (p-value = 0.0004; OR compared to mid-advanced career = 10.57, SE = 2.36, p-value = 0.06).

Among the personal links to neurodiversity, having autistic kin (OR = 19.15, SE = 2.18, p-value = 0.0001) and coexisting neurodevelopmental conditions (OR = 8.96, SE = 1.83, p-value = 0.0002) significantly predicted clinical/self-diagnosis.

Having a clinical/self-diagnosis increased the odds of mental health issues (OR = 5.82, SE = 1.63, p-value = 0.0003), but seniority made it less likely (OR = 1.91, SE = 1.39, p-value = 0.05).

Conclusions:

A leading network of autism researchers was found to include 50% of neurodivergent researchers, and with personal links to autistic people (kin 40%, friends 68%). Self-diagnosed people did not declare whether they disclosed this information; further investigation could clarify whether this links to stigma, perception of self vs clinical diagnosis, and knowledge of disclosure modalities. Lower seniority and close personal links to autism were associated with diagnosis, suggesting autistic people may not reach directorial roles. Diagnosis was associated with mental health issues, but the protective instrumental effect of seniority suggests that one’s job may foster discovery of one’s needs.

426.360  (Poster) Pandemic-Related Interruptions to Early Identification and Intervention

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Background:

The COVID-19 pandemic disrupted educational systems for young students with autism. Child Find services, eligibility evaluations, and enrollment into special education were suspended or delayed due to closures and/or social distancing requirements that made administering traditional assessments difficult. Even the students who had already received a diagnosis had limited access to educational facilities when many specialized preschool programs were closed. Some families chose to delay entry into kindergarten rather than begin school under such uncertain circumstances. This caused many students with autism to miss out on the early intervention and early school-aged services that they would have received during normal times.

Objectives:
The purpose of this study is to assess the changes in the proportions of autistic students identified and enrolled in preschool and early school-aged classrooms during the pandemic. This information is a key first step in order to evaluate the level of interruption of services these students experienced and provide a baseline to follow the long-term educational impacts.

**Methods:**

Using four years of administrative data from a school district in Indiana, we compared the number of students with autism enrolled in prek/kindergarten/1st grade each year from 2018 to 2022. Data on the total number of students with disabilities was also examined, to discern if children with autism were disproportionately impacted by the pandemic compared to other students in special education. The district is a large, urban, and serves 16,000 students/year, approximately 3,000 of whom with disabilities (18%). It is racially and ethnically diverse (37% Black, 27% White, 24% Hispanic, and 10% multiracial). About 10% of the student body are English language learners, and most students (65%) come from economically disadvantaged households. Data was extracted from the District’s Ed-Fi Operational Data Store (ODS) that houses the Student Information System (SIS) data in a standardized format.

**Results:**

There was a precipitous drop in special education identification during the pandemic. Only one student with autism was enrolled in the district’s preschool programs during the 2020-2021 pandemic school year. The number rebounded last year (2021-2022 school year) with 45 new students with autism enrolled. A similar drop and rebound occurred for overall numbers of students with disabilities. In preK and K-1 classrooms across the district there were 685 students in special education before the pandemic, during there were 393, and post pandemic the number returned to 680 students.

**Conclusions:**

This study shows that young students with autism were not identified or enrolled in specialized education during the pandemic. Although there was nearly 50% drop in enrollment for all students with disabilities in prek-1 during the 2020-2021 school year, those with autism appear to have been significantly more impacted. There are likely to be ongoing ramifications for these students who effectively missed out on a year of services. Even for students who attended school in 2020-2021, their social skills goals were often removed from their IEPs due to social distancing requirements (authors, 2022) which has ongoing impacts to their interactions and social behavior.

426.361 (Poster) Pilot Feasibility Study of Clinical Implementation of a Sustainable Telehealth Assessment Model for Autism Spectrum Disorder

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**Background:** Innovative assessment models for autism spectrum disorder (ASD) can increase access to services (Zwaigenbaum & Warren, 2020). The COVID-19 pandemic necessitated creating novel telehealth assessment models to continue to serve the needs of families. However, more data is needed to determine whether these new models can be integrated long-term into pre-pandemic assessment models to improve access to care for those with barriers related to geographical location, need for additional childcare, transportation, and other factors. Sustaining and continuing to improve telehealth assessment methods has the potential to increase agility during future adverse events limiting access to in-clinic services.

**Objectives:** Develop and implement a sustainable telehealth assessment model for ASD that would be equivalent to in-clinic services and improve access to care for families with possible barriers.

**Methods:** An interdisciplinary team of psychology, developmental pediatrics, and speech therapy providers from a development assessment center at a large US children’s hospital convened for eight meetings over five months to transition a telehealth assessment model for children ages 3 and under created during the COVID-19 pandemic into a sustainable model integrated into existing in-clinic services. Factors considered for sustainability included equivalency to existing services, need for services to increase access of care, demand for telehealth services post-pandemic, staffing, and licensing and billing for telehealth vs. in-clinic services. A triaging protocol was created with input from intake clinicians to identify families with possible access barriers that could be addressed by telehealth. Basic demographic data (e.g., distance from clinic, insurance status, social determinants of health), attendance to evaluation appointment, final diagnoses, and Childhood Autism Rating Scale, second edition (CARS-2) scores were collected through chart review for children referred for telehealth (n=33) and in-clinic interdisciplinary evaluations (n=148) between December 2021 and August 2022. Data on reason for referral to telehealth services was also collected. T-tests and Fisher exact tests were used to test for group differences.

**Results:** Feasibility analyses determined that the initial telehealth model was reasonably equivalent to current in-clinic assessment services in terms of interdisciplinary evaluation processes and time billed. The initial stream of referrals has steadily filled two interdisciplinary centers.
telehealth evaluation slots per week for the last five months. Families were referred for telehealth services most often due to distance from clinic (70%), childcare needs (20%), and general family stress (20%). Children seen in telehealth evaluations did not differ from those seen in-clinic on social determinants of health, insurance type, rural location, age at referral, and CARS-2 scores (all \( p > 0.05 \)). A diagnosis of ASD was given more frequently in the telehealth group than the in-clinic group (\( p = 0.04 \)).

**Conclusions:** Initial results indicate a continued small but sustainable demand for telehealth services that can address possible barriers to care. Results indicate both models are serving an equivalent population, although those seen by telehealth were more likely to be diagnosed with ASD. It is possible intake clinicians referred to telehealth when more confident in initial ASD symptoms, although further data is needed. Next steps include addressing barriers allowing for sustainable telehealth services for older children.

426.362 (Poster) Post-Diagnosis Support for Autistic Adults: Context, Positive and Negative Experiences and Proposed Solutions to Address Gaps in Service Provision. A Qualitative Study

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**Background:** Research shows there are few support services and specific gaps in provision for people following a diagnosis of autism in adulthood. Most findings focus on deficits in provision with little emphasis on positive experiences and solutions.

**Objectives:** We aimed to (i) examine experiences of receiving/providing an autism diagnosis in adulthood as context to any support services that may be required (ii) explore positive experiences and solutions to address gaps in post-autism diagnosis support services provision in the context of (iii) perceived gaps and limitations in support service provision.

**Methods:** Autistic adults, relatives and clinicians recruited from the ASC-UK adult autism cohort (https://research.ncl.ac.uk/adultautismspectrum) were surveyed about recent experiences of UK adult post-autism diagnosis support services within 12-months following the diagnostic assessment. Thematic analysis of verbatim survey content using a semantic approach was undertaken. To ensure high quality data analysis, the following methods were employed: comparing key characteristics of autistic adult survey participants (responders) with non-responders; data double-coding; and data from the stakeholder groups were triangulated to provide multiple perspectives on common and divergent views.

**Results:** 343 autistic adults, 45 relatives and 35 clinicians completed parallel surveys. Five super-ordinate themes were defined. **Theme 1: Reorientation to self and others after diagnosis** with two subthemes: Inter-personal and Intra-personal changes experienced ["...my social anxieties...subsided once diagnosed. I was able to reduce my anxiety meds’ autistic adult"]. **Theme 2: Examples of effective/acceptable support available:** One autistic adult said: ‘For me, it was really important to get a job coach, to support me with ensuring reasonable adjustments at work’. Another autistic adult said ‘with my diagnosis report, the psychologist included a page to give to my work to say “these are the things I struggle with, and what you can do to help me”’. **Theme 3: Characteristics of effective/acceptable support** comprised three subthemes: psychoeducation, support for families/carers [’My wife and I attended parallel courses. Myself for those diagnosed with autism, and my wife for those who were ‘carers’. It was helpful’] and personalisation [’My diagnosis letter was in my birthing notes and helped me have an infinitely better birthing experience. I had my own room after the birth and not thrown onto a ward with even more crying babies (total sensory overload meltdown situation first time around without knowing why) autistic adult’]. **Theme 4: Organisational factors facilitating effective/acceptable support** focussed on good connections with other services and community-based support [’My counsellor was brilliant and helped me gain some confidence back and accept my diagnosis’: autistic adult]. **Theme 5:** considered Context including perceived gaps in support/services available and how to fill them: ‘post-diagnostic materials [web-based] that could be shared’[’because I don’t live in the city where the service is’].

**Conclusions:** Involving perspectives of relevant stakeholders and building on their direct positive experiences and recommendations can constructively inform development of effective support services for autistic adults in the future. Those commissioning and providing post-diagnostic support can use these examples of support that led to positive change to enhance their post diagnostic support provision.

426.363 (Poster) Predicted Rate of Having a High-Cost Chronic Condition Among Adults with Intellectual Disability and/or Autism Spectrum Disorder By Disability Benefit Status

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**Background:** Adults with intellectual and developmental disabilities (IDD) face complicated systems to qualify and receive disability benefits in the United States. The way in which disability is measured and defined varies across local, state, and federal programs. The Social Security Disability Insurance (SSDI) program provides a monetary benefit for basic needs based on inability to work and Federal disability determination standards. Individuals \(<65\) years qualifying for SSDI are eligible for Medicare to support healthcare services after a 24-month wait. U.S. states have different disability-related standards to qualify for Medicaid service-based benefits not dependent on
income. Individuals can qualify for both Federal and State disability. Understanding factors associated with receiving disability benefits can inform efforts to improve access to essential disability supports.

Objectives: This study evaluated the association between presence of a co-occurring chronic condition and receipt of disability benefits among adults 18-64 years with Intellectual Disability (ID) and/or Autism Spectrum Disorder (ASD) who qualified for federal (SSDI and Medicare) and/or state (Medicaid-only).

Methods: We used the Medicare-Medicaid Linked Enrollees Analytic Data Source (MMLEADS,v2), which includes chronic condition variables. The denominator (n=850,616) were beneficiaries 18-64 years with ASD and/or ID receiving Federal SSDI+Medicare and/or State-based Medicaid (on the basis of disability). The numerator represented adults with Federal (n=355,505) or State-only (n=495,111) disability by ASD and/or ID status. 92.47% of the Federal+ group (n=328,737) are dually-eligible for Federal and State disability benefits. Chronic conditions included: depression, epilepsy, Alzheimers, diabetes, arthritis, obesity, cancer, and heart disease (myocardial infarct, hypertension). Descriptive statistics and logistic regressions adjusting for age, gender, race/ethnicity, ID-status, U.S. Census region, and rurality were conducted.

Results: There were 850,616 beneficiaries in the MMLEADS and, of those, 41.79% qualified for Federal benefits. The top chronic conditions were depression, heart disease, and epilepsy. Those with Federal disability, regardless of DD, had 2.47 greater odds of having depression (95%CI: 2.44-2.50), 1.48 greater odds of having heart disease (CI:1.46-1.50), and 1.02 greater odds of having epilepsy (CI:1.01-1.03). Having a Federal disability determination was associated with greater odds of having any chronic condition (OR=1.60, CI:1.58-1.61). However, the strength of this association was based on age and disability type. The predictive probability of a chronic condition on receiving Federal benefits varied most in the youngest age group and least in the oldest age group (Figure 1). Autistic adults with ID were more likely than those without ID or with ID-only to have a chronic condition in both the Federal + and State Only disability eligibility groups.

Conclusions: Those with Federal benefits were significantly more likely to have chronic conditions that those with State benefits. Almost 50% of young autistic adults with ID who qualify for Federal disability benefits also had chronic health conditions requiring coordinated, effective care for mental (e.g. depression) and physical (e.g. heart disease) chronic conditions. Discontinuous services and lack of a consistent way to determine disability across states and federal systems hamper care and likely result in disparities in access to care. Implications for public health and disability services will be discussed.

426.364 (Poster) Predictors of Early Intervention Referral after a Positive Developmental Screen in Community Primary Care Clinics

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Background:

Primary care physicians (PCPs) may rely on clinical judgement rather than screening test scores in making referral decisions for children with autism and other developmental disabilities (DD).

Objectives:

This study investigated which patient and screening test factors predict a PCP’s Early Intervention (EI) referral after a positive Modified Checklist for Autism in Toddlers, Revised (MCHAT-R) or Ages and Stages Questionnaires (ASQ-3) screening test result.

Methods:

Child developmental screening test results and EI referral decisions were collected via medical record review of 1,864 15-, 18- 24- and 30-month well-child checks conducted at 7 community primary care clinics in 4 Oregon counties, in 2020-2021. We tested the association of receipt of EI referral with screening test scores and child demographic data (sex, language, race/ethnicity), using binary logistic regression. ASQ-3 domains and overall ASQ and MCHAT-RF scores were considered separately.

Results:

59% of of children with MCHAT-RF ≥3, and 47% of children with ASQ-3 ≥ 2 received EI referrals. 41% were not referred even after receiving an ASQ-3 cumulative score ≥ 5. Multivariable analyses showed that M-CHAT-RF score, ASQ overall score, and all ASQ domain scores except Problem Solving, predicted EI referral. The Communication domain accounted for the most variance in predicting EI referral.
Predictors of Repeat Hospitalizations for Behavioral Health in Children with Autism

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Background:
Children with autism spectrum disorders (ASD) require more visits to the Emergency Department (ED) than typically developing children. For children with ASD, aspects of their diagnosis also make them particularly ill-suited to the ED environment. As a result, outcomes for these patients are generally poor, with longer lengths of stay, increased likelihood of repeat admissions for crisis intervention, and more invasive forms of medical care, such as restraint or inpatient hospitalization. Repeat hospitalizations are particularly problematic as it can...

Predictors of Participation in Autism Evidence-Based Practice Training within an Early Intervention System

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Background: Early access to autism evidenced-based practices (EBPs) has been shown to support autistic children’s developmental trajectories and improve quality of life (Mason et al., 2018). To help foster early access to autism intervention, there is a growing interest in delivering Naturalistic Developmental Behavioral Interventions (NDBIs) in Early Intervention (EI) systems, which serve as a natural entry point to services for children aged 0-3 years with developmental delays. Research shows that EI providers who participate in NDBI training can increase their fidelity to these models (Rogers et al., 2022; Stahmer et al., 2020). However, not all providers complete implementation initiatives; further, limited research has examined provider- and system-level factors that predict the extent to which providers participate in NDBI training.

Objectives: The objectives of this study are to examine: (1) factors that predict the uptake of autism EBPs within Georgia’s EI system; (2) factors that predict EI providers’ perceptions of feasibility and acceptability of autism EBPs; and (3) how providers deliver autism EBPs after training.

Methods: Preliminary data is available for 57 EI providers, although data collection is ongoing. Providers participated in one of two NDBI training opportunities: (1) Project ImPACT, an evidence-based parent-mediated intervention (Ingersoll and Dvortcsak, 2019); or (2) the Autism Navigator, an online platform providing information on autism and evidence-based strategies for supporting autistic toddlers. Prior to training for either program, providers completed measures of (1) demographic information; (2) attitudes towards evidence-based practices; and (3) perceived level of support to attend training and consultation. Following training, all providers participated in group consultation for one hour per week over 12-weeks and completed measures of feasibility, acceptability, and intervention delivery. Linear and logistic regression models were used to examine predictors of EI provider participation in NDBI training. Descriptive statistics were used to examine delivery of autism intervention following training.

Results: 91.1% of providers agreed that they learned new skills by attending professional training in the last year. However, 60.0% agreed, to at least a moderate extent, that clinical experience outweighs manualized interventions. Results from a binary logistic regression model predicting autism NDBI training completion are displayed in Table 1. Both NDBI training opportunities, Project ImPACT and the Autism Navigator, predicted training completion above and beyond provider attitudes, perceived level of training support, and years of experience. Of the EI providers who completed training (n=40) and consultation (n=37), 54.8% indicated delivering either Autism Navigator or Project ImPACT to several additional families on their caseload.

Conclusions: Preliminary findings suggest that specific NDBI training content and structure may impact provider engagement within EI systems. Although data collection is ongoing, these findings provide insight into training processes by which NDBIs can be translated into the EI system and the barriers and factors that influence their use by EI providers. This information may allow for the development of implementation strategies and training methods in partnership with EI providers that support provider use of NDBI models and, in turn, family access to evidence-based early intervention treatment.

Predictors of Repeat Hospitalizations for Behavioral Health in Children with Autism

A. Pavlov, Marcus Autism Center, Atlanta, GA

Background:
Invasive forms of medical care, such as restraint or inpatient hospitalization. Repeat hospitalizations are particularly problematic as it can...

Conclusions:
Screening test and clinical thresholds for EI referral differ substantially. The majority of children who are at high risk for developmental concerns or autism are not receiving EI referrals from PCPs. Girls and children with problem solving challenges are least likely to be referred. These findings may help inform physician training on developmental and autism screening in primary care.

Predictors of Participation in Autism Evidence-Based Practice Training within an Early Intervention System

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Background: Early access to autism evidenced-based practices (EBPs) has been shown to support autistic children’s developmental trajectories and improve quality of life (Mason et al., 2018). To help foster early access to autism intervention, there is a growing interest in delivering Naturalistic Developmental Behavioral Interventions (NDBIs) in Early Intervention (EI) systems, which serve as a natural entry point to services for children aged 0-3 years with developmental delays. Research shows that EI providers who participate in NDBI training can increase their fidelity to these models (Rogers et al., 2022; Stahmer et al., 2020). However, not all providers complete implementation initiatives; further, limited research has examined provider- and system-level factors that predict the extent to which providers participate in NDBI training.

Objectives: The objectives of this study are to examine: (1) factors that predict the uptake of autism EBPs within Georgia’s EI system; (2) factors that predict EI providers’ perceptions of feasibility and acceptability of autism EBPs; and (3) how providers deliver autism EBPs after training.

Methods: Preliminary data is available for 57 EI providers, although data collection is ongoing. Providers participated in one of two NDBI training opportunities: (1) Project ImPACT, an evidence-based parent-mediated intervention (Ingersoll and Dvortcsak, 2019); or (2) the Autism Navigator, an online platform providing information on autism and evidence-based strategies for supporting autistic toddlers. Prior to training for either program, providers completed measures of (1) demographic information; (2) attitudes towards evidence-based practices; and (3) perceived level of support to attend training and consultation. Following training, all providers participated in group consultation for one hour per week over 12-weeks and completed measures of feasibility, acceptability, and intervention delivery. Linear and logistic regression models were used to examine predictors of EI provider participation in NDBI training. Descriptive statistics were used to examine delivery of autism intervention following training.

Results: 91.1% of providers agreed that they learned new skills by attending professional training in the last year. However, 60.0% agreed, to at least a moderate extent, that clinical experience outweighs manualized interventions. Results from a binary logistic regression model predicting autism NDBI training completion are displayed in Table 1. Both NDBI training opportunities, Project ImPACT and the Autism Navigator, predicted training completion above and beyond provider attitudes, perceived level of training support, and years of experience.

Conclusions: Preliminary findings suggest that specific NDBI training content and structure may impact provider engagement within EI systems. Although data collection is ongoing, these findings provide insight into training processes by which NDBIs can be translated into the EI system and the barriers and factors that influence their use by EI providers. This information may allow for the development of implementation strategies and training methods in partnership with EI providers that support provider use of NDBI models and, in turn, family access to evidence-based early intervention treatment.
overwhelm hospital systems and ultimately indicates a failure in stabilization and a mismatch between patient need and available crisis services.

The available literature has primarily compared hospital admissions for children with ASD to those of their neurotypical peers and largely focuses on those admitted for primary medical or co-morbid psychiatric chief complaints (e.g., GI issues, seizures, suicidality, depression). To date, the authors are unaware of a study comparing children with ASD who are admitted once to those who present more than once for a primary behavioral health chief complaint to look at the unique factors within the population.

Understanding what variables contribute to the risk for readmission to the ED for children with ASD for behavioral health complaints can help us better identify these patients, equip hospital emergency rooms to meet the census, and more aggressively match intervention to their unique needs.

Objectives:

This study aims to examine predictors of repeat hospitalizations for behavioral health chief complaints in a cohort of children diagnosed with ASD. The study examined variables hypothesized to predict return rate including age, sex, height, weight, restraint, and length of stay.

Methods:

This study is a retrospective chart review of all patients diagnosed with ASD who presented to one of three ED between 1/01/2019 – 12/31/2019 for a chief complaint of a behavioral health concern. Encounters from the patient’s electronic medical record system were coded for all relevant variables associated with the participant’s ED admission. A total of 213 encounters were coded.

Results:

A total of 146 unique patients presented to the ED in 2019 (15 females, 131 males). Of those patients, 37 patients (25.34%) were admitted more than once (M = 3, Range 2 - 12) during the twelve-month period examined. A linear regression using a generalized linear model with number of visits as a continuous variable, where the true number of visits was used as the outcome, was used to analyze the data. Results indicated that age, weight, BMI, and medical restraint did not predict readmissions to the ED while length of stay (p = .007) and physical restraint (p < .001) did predict readmission to the ED.

Conclusions:

Children with ASD are at an increased likelihood for admission to the ED for behavioral health concerns. Understanding what variables contribute to the risk for readmission to the ED for children with ASD can better equip medical providers and hospital emergency rooms to meet the census and needs of this population.

**426.367 (Poster) Primary Care Provider Perspectives on Autism Screening: A Multi-Methods Study of Barriers to Equitable Referral**


Background: The goal of detecting and intervening early for autism spectrum disorder (ASD) remains elusive. Guidelines for screening in pediatric primary care and early referral for interventions and diagnostic assessment are well established (including from the American Academy of Pediatrics, AAP). However, adherence is inconsistent, contributing to delays as well as racial, ethnic, and socio-economic disparities in diagnosis and care.

Objectives: To identify barriers to equitable screening and referral after a positive ASD screen for young children in pediatric primary care.

Methods: Multi-method data were collected within a large academic pediatric primary care network with high rates of screening [>86% of all 16-26-month-old children screened at least once with the Modified Checklist for Autism in Toddlers with Follow-Up (M-CHAT/F) between 2018 and 2021]. Primary care network providers completed a survey and interview about their knowledge, intentions, and experiences with ASD screening and referral. Surveys included a measure of intentions’ regarding reporting positive screening results and referring children with positive screens to interventions and for ASD evaluation. We summarized survey results descriptively. Interviews were recorded, transcribed, coded, and analyzed thematically.

Results: A total of 69 providers responded to the survey (317 invited; response rate, 21.7%), including 58 attending physicians (76.3%) and 11 advanced practice nurses; most (91.3%) were female. Most (68.1%) providers reported having 15 minutes or less allotted for well-child
visits. Few providers reported receiving additional training in ASD (n=10, 14.5%) such as continuing education or conference participation. Knowledge about ASD screening recommendations from the AAP varied: 97.1% of respondents correctly identified 18 months as an AAP-recommended age of screening, and fewer correctly identified 24 months (79.7%) or whenever there is a concern raised (62.3%). Regarding recommended actions after a positive screen, 78.3-84.1% correctly identified each possible action after a medium or high-risk screen.

Providers reported strong attitudes toward and normative pressure to discuss screening results (Figure 1, panel A) and refer children after a positive screen (Figure 1, panels B & C). However, there was greater variability in their reported self-efficacy to discuss screening results and refer for evaluation (Figure 1, panels A & C).

Qualitative interviews with 39 of the surveyed providers helped elucidate barriers to screening and referral (Table 1). Providers reported that the biggest barriers they face are lack of training, time during visits, and available referral resources. These barriers discourage them from referring all but the most “severe” cases, and instead encourage them to “wait and see.”

Conclusions: We identified deficits in provider knowledge about ASD screening and referral; additional education is needed. Additionally, there are gaps between provider intentions and actions regarding referral after a positive screen. Barriers to screening and referral include lack of referral sources and frustration at not having resources to offer families after a positive screen.

Limitations include a low response rate, although non-respondents might have even lower interest or engagement in ASD screening processes, and lack of generalizability to non-academic practices. Ongoing work includes gathering family perspectives to identify acceptable strategies to improve screening and referral processes.

426.368 (Poster) Promoting Interdisciplinary Preventive Care for Cardiovascular Disease (CVD) with the Autism Spectrum Disorder Population: A Scoping Review

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Background: The purpose of this investigation is to: 1) examine the implications of cardiovascular health with children and adolescents with ASD, and 2) make a case for the inclusion of motor deficits (MD) in clinical guidelines for the treatment of ASD. CVD is the leading cause of mortality in the ASD population. Eighty to ninety percent of children with ASD have motor deficits. Evidence also suggests MDs are a precursor to social and cognitive dysfunction, limiting engagement in play and occupations. Based on the DSM V manual criteria for diagnosis of ASD, clinical guidelines for treatment fail to account for motor dysfunction. However, the implication for cardiovascular health is a significant issue that is preventable with the timely treatment of motor deficits. The dynamical systems theory provides the underpinnings to explore the implications of cardiovascular health and quality of life of this population.

Objectives: 1. Understanding clinical presentations that are not otherwise included in the Diagnostic and Statistical Manual V criteria for ASD.

2. Increase the understanding of the correlation between motor deficits and cardiovascular disease in the ASD population.

3. Advocate for interprofessional collaboration to provide patient-centered and preventative care.

Methods: A scoping review, consisting of an extensive database search, includes CINHAL, PUBMED, EMBASE, and Cochrane. Inclusion criteria used: Ages: 1 month to 20 years, English articles published 2010 onwards, and studies examining physical health and cardiovascular health with ASD, and exclusion criteria included: comorbidities of learning and language disorders, cerebral palsy, and seizure disorders.

Results: Children born with cardiac issues are more likely to have ASD. MDs with this population limit the ability to meet environmental demands in the classroom, playground, social interactions, and a press for mastery. A lack of optimal motor skills development limits the potential to transition into adulthood with a good quality of life. Chronic disorders such as obesity present in this population increase the likelihood of CVD. MDs and obesity in this population necessitate early interdisciplinary intervention to promote age-appropriate engagement in play and ADLs at home, at school/playground, and in the community and prevent the incidence of CVD in this population.

Conclusions: Cardiovascular health has significant implications for health and quality of life for this population. Therefore, the inclusion of motor deficits in the clinical guidelines is recommended.

426.369 (Poster) Promoting Wellbeing in Autistic Youth and Adults through a Positive Focus on Sexuality and Gender Diversity: Education, Clinical Practice, Research, and Policy Recommendations
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Background:

Sexuality is part of children and adolescents’ development and an important part of life. Studies conducted over the past 40 years revealed that autistic adolescents and adults too often lack tailored and comprehensive sexuality education and accessible information. In addition, attention to sexuality in healthcare remains limited. Also, more autistic adults identify as LGBTIQ+ or enjoy non-heteronormative sexuality or intimate relationships and therefore may face additional marginalization and stress, impacting their mental health. Until now, recommendations for supporting sexual health and wellbeing in autistic individuals are lacking.

Objectives:

Using a community based participatory approach, this project aimed to develop consensus recommendations for education, clinical practice, research, and policy to promote sexual wellbeing, with attention to the needs of sexual and gender diverse individuals, and make them available to a broad audience.

Methods:

The project was initiated and conducted by a core group (3 autistic, 3 non-autistic; researchers, clinicians and self-advocates) in close collaboration with an international group of 21 leading autistic and non-autistic experts in the field of autism, sexuality and gender diversity with a background in research, clinical practice, and self- and parent advocacy. In a first online expert meeting in May 2022, the experts provided input to create a set of recommendations, through the Nominal Group Technique. In a second phase, a call was put to autism communities across the world to complete an online survey, to rate the initial 11 policy recommendations and provide feedback. Survey results and their implications were discussed in a second online expert meeting in August 2022.

Results:

Based on the input from the expert meeting, a set of 11 recommendations was developed, grouped in four themes: 1) better education and information about sexuality and gender identity, 2) promoting supportive and inclusive communities, 3) building capacity to offer better sexuality, gender diversity, and health related services for autistic people and 4) sexuality and gender diversity research and meaningful inclusion of the autistic community. In total, 493 participants completed the survey (353 autistic adults, 140 non-autistic family members and professionals). They were a diverse group in terms of role (e.g., autistic adult, parent, professional), country, sex assigned at birth, gender identity, sexual attraction, living situation and type of sexuality education, although people living in Western countries were overrepresented.

High agreement between autistic and non-autistic participants resulted in the selection of eight recommendations. Three recommendations, relating to promoting supportive and inclusive communities were rated just below the threshold. Feedback and responses to an open question were analyzed and revealed additional specifications but no new recommendations.

Conclusions:

Experts and the community agreed on a set of eight consensus recommendations for education, clinical practice, research, and broader policy to promote and support sexual health and wellbeing in autistic individuals across the lifespan. These recommendations are crucial next steps to improve wellbeing of the autism community, describing different approaches to promote wellbeing that can be adjusted to the local situation. Experts and participants in the global South should be specifically targeted in future initiatives.

426.370 (Poster) Providing Telehealth Support for Caregivers of Autistic Children Using a Mobile App

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Background: Autism spectrum disorder (ASD) presents with challenges for caregivers and providers while impacting a child’s developmental trajectory across several domains, including behavior challenges. Unfortunately, due to limited access and affordability of care, especially during the pandemic or other situations that require people to stay at home, in-person services are not always feasible. Rural or underserved communities face additional barriers, such as geographic isolation and lack of autism-specific resources. Accessibility
of autism treatment may be expanded through telehealth supports, such as mobile applications. When implementing these supports for autistic children, decreasing child problem behaviors while improving caregiver stress, knowledge, and competence is crucial. Providing a telehealth platform for caregivers of autistic children may help improve the accessibility of autism services.

**Objectives:** The objective was to conduct a pilot study of a behavior consultation mobile application, *Treks*, to improve telehealth support for caregivers of autistic children. This study aimed to investigate: (1) the feasibility of the mobile application by examining attrition, compliance, ease of use, and appropriateness of *Treks*, and (2) the preliminary benefits on caregiver and child outcomes following use of *Treks*.

**Methods:** Participants included 26 caregivers (*n* = 2) of autistic children (3-13 years), who were randomly assigned to a one-session telehealth parent-training consultation with 1) the enhancement of the *Treks* app over the course of one month (TH; *n* = 14) or 2) with access to mobile resources comparable to *Treks* for one month (CC; *n* = 12). They were then administered measures at baseline (T1), pre-*Treks* (T2), and post-*Treks* (T3) to assess changes in caregiver stress, knowledge, competence, and child behaviors. Metrics were also calculated to understand acceptability, appropriateness, and feasibility of *Treks* as well as satisfaction, fidelity, and compliance.

**Results:** Findings revealed that *Treks* was received positively across groups, ranging from moderate to high satisfaction. Feasibility questionnaires showed moderate to high ratings of acceptability, appropriateness, and feasibility of *Treks*. Participants provided positive feedback on the structure and content of *Treks* with others raising some concerns related to technical issues (e.g., getting signed out of the app). In terms of preliminary efficacy, there was a significant improvement in TH participants from T2 to T3, specifically showing significant mean decreases in child behaviors and caregiver stress and increases in caregiver knowledge and competency. Results from CC participants showed a nonsignificant trend towards improvement across outcome measures, with a significant increase in caregiver knowledge from T2 to T3.

**Conclusions:** Findings revealed feasible outcomes and brief support of this telehealth application. The implementation of *Treks* should continue to be examined, as it has the potential to improve caregiver and child outcomes when delivered as a consultation or supplement to full treatment. Families of autistic children experience varying levels of stress, and the addition of mobile telehealth services can provide necessary and accessible supplemental support. This project increased accessibility of services to rural families of autistic children during the height of the pandemic, and future research will continue to examine the use of *Treks* across transdiagnostic settings in under-resourced populations.

**426.371 (Poster) Qualitative Insights into Improvement of Primary Healthcare for People with Autism: A Delphi-Study**


**Background:** People with an autism spectrum diagnosis (ASD) often experience a range of barriers in accessing healthcare (Mason et al., 2019; Nicolaidis et al., 2015; Walsh et al., 2020). In addition, they have an increased morbidity and mortality risk (Croen et al., 2015; Hirvikoski et al., 2016). Since providing (access to) appropriate healthcare is a main task of general practitioners (GPs), improvement of primary healthcare for autistic people is a necessity (Raymaker et al., 2017, Walsh et al., 2021). In order to improve primary healthcare, useful and feasible recommendations for general practice, based on both the needs of primary healthcare providers (HCPs) and autistic people, are needed (Gilmore et al., 2022; Walsh et al., 2021).

**Objectives:** Therefore, the aim of this study was to evaluate barriers and identify recommendations to improve primary healthcare for autistic people, based on both the needs of autistic adults and primary healthcare providers (HCPs).

**Methods:** This study was developed within the Dutch Academic Workplace Autism (*Academische Werkplaats Autisme*), which is a collaborative effort of autistic (advocacy) organizations, clinical institutions, and academic institutions with the aim to improve the lives and health of the autistic population based on outcomes of co-created academic research. The project-team for this specific study consisted of different HCPs, researchers, and members with lived experience (i.e., autistic adults and parents of an autistic child). In Figure 1, the qualitative study design (preparatory phase and Delphi-study) was summarized. In the preparatory phase, we performed semi-structured interviews (with 11 adults: parents of autistic people and HCPs) to evaluate what type of barriers are present for autistic people in Dutch healthcare. To summarize these interview-results, a thematic analysis was executed. Next, in the Delphi-study, a panel of 21 autistic adults and 20 primary HCPs (10 GPs and 10 GP-nurses/-psychologists) participated. Barriers in primary healthcare for autistic people were rated regarding negative impact and suggested recommendations were assessed based on usefulness and feasibility.

**Results:** In the interviews, 20 barriers in Dutch healthcare for autistic people were identified: barriers related to HCPs, barriers related to autistic traits, and barriers related to the healthcare system and the social support system. In the Delphi-study, primary HCPs rated the negative impact of most barriers in primary healthcare relatively lower than the autistic participants. This Delphi-study resulted in 22 recommendations to improve primary healthcare for people with ASD: focused on primary HCPs (i.e., education enriched with input from
people with lived experience), on the social network and organization (i.e., related to more continuity in care), and on autistic people (i.e., recommendations to improve preparation for a GP appointment).

**Conclusions:** Primary HCPs underestimate the negative impact of barriers in primary healthcare for autistic people. With use of the Delphi-method, useful and feasible recommendations to improve primary healthcare for autistic people were identified, based on the needs of autistic adults and primary HCPs. The Dutch Academic Workplace Autism will publish an informational leaflet including these recommendations in a visual overview for primary HCPs and autistic people.

426.372 (Poster) Quality and Accessibility of Written Development Assessment Reports Provided to Caregivers in a Publicly Funded Child Developmental Assessment Service

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**Background:**

Despite long wait times, public pediatric developmental assessment services remain crucial for assessment of vulnerable children. Assessment represents a critical opportunity to guide the placement of supports to improve functioning and developmental trajectories. There is, however, a lack of research examining how services conduct assessments, synthesize results, and provide reports to families.

**Objectives:** Reports were evaluated for whether they 1) addressed caregiver perceived needs, 2) used available data to provide appropriate information about child needs, 3) provided recommendations that were actionable and specific to needs, 4) had appropriate readability levels and 5) followed existing autism assessment guidelines.

**Methods:** This study retrospectively examined 85 reports provided to caregivers at a developmental assessment service. A report extraction checklist was developed to determine whether reports followed developed criteria.

**Results:** Findings showed clinicians were more focused on autism diagnostic needs while caregivers were more focused on transdiagnostic needs. Recommendations related to autism diagnoses were specific and actionable, but rarely addressed transdiagnostic needs or comorbidities (e.g., cognitive impairments, mental health). For instance, only 13% of reports contained recommendations for conditions other than ASD, despite 61% of the population receiving two or more diagnoses. Reports largely followed autism guidelines, but the language used was more complex for families than recommended.

**Conclusions:** While developmental assessment services reviewed conducted a high quality multi-disciplinary assessment that largely followed recommendations and existing guidelines, areas of improvement were noted. Some of these areas reflect challenges of assessment for practice internationally. Recommendations for future practice are provided.

426.373 (Poster) Racial, Ethnic, and Language Disparities in Healthcare Services Utilization in Children Diagnosed with Autism: Five-Year Follow-up after Diagnosis

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**Background:**

Children with autism require timely and ongoing healthcare services to support their health and developmental needs. However, children with autism from Black, Hispanic, and non-English speaking backgrounds children with autism with low English proficiency receive fewer autism health services compared to non-Hispanic White and English-speaking children, placing them at risk for poor health and development. Insufficient service receipt early in life may lead to increased service needs in later childhood or adolescence, a little is known about the longitudinal trends and cumulative gaps in health service utilization among children with autism from disadvantaged backgrounds.

**Objectives:**

To explore the racial/ethnic and language disparities cumulative healthcare service utilization in children with diagnosed with an autism spectrum disorder (ASD) over a five-year period.

**Methods:**
We identified a patient cohort (N=287, aged between 0-17) who were diagnosed with ASD and classified as Autism or Autism Spectrum by the Autism Diagnostic Observation Schedule or Autism Diagnostic Interview-Revised in 2014 at the major pediatric healthcare system in New Jersey, USA. Data on the patients’ five-year service utilization (2014-2019) and demographic information were extracted from electronic medical records. Healthcare services are defined as the total number of outpatient clinic visits made to a primary care pediatrician or specialty care provider in neurodevelopmental pediatrics, neurology, psychiatry, psychology, speech/occupational/physical therapy, nutrition, and audiology. Healthcare utilization was compared by age group, sex, race/ethnicity, and preferred language for medical communication.

Results:

Table 1 presents participant demographics and service utilization summary. Of the 286 identified children, 144 were non-Hispanic White and 142 were of minority race and/or ethnicity (60 Hispanic, 39 non-Hispanic Black, 15 Asian or Pacific Islander, 1 American Indian/Alaskan, and 22 other or multiple races). Thirty-four children preferred communication in a language other than English; the majority communicated in Spanish (n=29). Compared to non-Hispanic White children, minority children in this sample had an earlier diagnosis age and more frequent use of therapy services (e.g., psychology, speech-language/ occupational/ physical therapy, applied behavioral analysis, nutrition, or auditory). Poisson regression models showed that minority children in this sample received more physician and therapeutic services five years after the diagnosis after adjusting for age and sex (Table 2).

Conclusions: Contrary to our hypothesis and the literature, the findings showed greater cumulative service utilization among children with autism from historically disadvantaged backgrounds. This may suggest the need to examine the role of other relevant covariates such as clinical severity, co-occurring developmental disability, and insurance type (private or public). These covariates will be included in the final analysis for the presentation. Additionally, we will further explore the trend of service utilization over the five years in order to understand group differences in treatment for autism.

Background: Families with a child with autism spectrum disorder (ASD) who live in rural communities face many barriers to receiving care, including diagnostic and treatment services (Antezana et al., 2017). Traditional ASD research has defined rurality by the rural county definition, but counties often vastly differ by size and urban counties can include rural areas (Coburn et al., 2007). An alternate way to define rurality is by census tracts via a measure called the Rural-Urban Commuting Areas (RUCA; Morrill, Cromartie, & Hart, 1999). RUCA further divides rurality into a more precise definition (e.g., Urban, Large Rural, Small/Isolated Rural) and has found individuals living in small and isolated rural must travel farther to receive their treatment across different medical conditions (Caldwell, Ford, Wallace, Wang, & Takahashi, 2016).

Objectives: This study aimed to clarify rural healthcare disparities in ASD by analyzing precisely defined rural geographic regions for children referred for an ASD evaluation. By exploring the information gathered from ASD diagnostic visits, we can more accurately inform future research that aims to address access to quality care in the communities that need assistance the most. We predicted that families from rural communities would be from more socioeconomically disadvantaged areas, display greater severity of symptoms (therefore prompting the referral), and have less access to services.

Methods: The participants for this study were from a database composed of preschool children referred and clinically evaluated for an ASD diagnosis at a tertiary diagnostic clinic in the southeastern United States between 2010-2019. Participants’ home addresses were coded via RUCA conventions (e.g., Urban, Large Rural, Small/Isolated Rural). Preschoolers were defined as children who were under 5 years of age by the time of their ASD evaluation. Socioeconomic disadvantage was defined by the Area Deprivation Index (ADI), ASD symptom severity was defined by the ADOS Comparison Score, and access to services was defined by caregiver-report of number of service providers. A one-way ANOVA of the RUCA groups was conducted with the variables of interest.

Results: Participants included 350 individuals (73% male; M_age= 3.36 years, SD= 0.70) and 60% were diagnosed with ASD. Children from rural communities lived in more socioeconomically disadvantaged areas, (Urban [N=246] M=68.77, Large Rural [N=73] M= 79.38, Small/Isolated Rural [N=31] M= 79.42, F=10.534, p<.001), but did not differ in ASD severity or number of service providers (Table 1).

Conclusions: Preliminary results demonstrated that our rural families live in more disadvantaged communities than our urban families, indicating that rural communities would benefit from further public health interventions. However, current results should be interpreted with caution since children referred to tertiary care clinics are usually connected to multiple service providers before being referred. Additionally, these cases usually reflect difficult diagnostic questions, and this sample may not include children who are diagnosed by the primary care provider, potentially impacting severity differences. Therefore, analyses are ongoing to explore subdomain ASD severity differences, language, and adaptive differences to further elucidate potential geographic healthcare disparities (Table 2). Future studies
should utilize population-based sampling to better represent the experiences of rural families.

426.375 (Poster) School Absenteeism in Children and Adolescents on the Autism Spectrum – a Scoping Review

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Background: Education is a basic human right, preparing children and adolescents for future life and active citizenship. Globally, an estimated 258 million children and adolescents were out of school in 2018. School absenteeism is a heterogeneous phenomenon, with a range of potential adverse long-term consequences for the individual and the society at large. Recent population-based studies clearly suggest that children and adolescents on the autism spectrum are absent from school more days than their peers. However, the full scope of the literature on this topic has not yet been synthesized.

Objectives: The aim of this scoping review was to provide a comprehensive overview of all research to date on all forms of absence from school in children and adolescents on the autism spectrum, with a view to present a historical and cross-cultural perspective on the field, outline major themes from this body of research, and identify important gaps in the literature.

Methods: Five relevant databases (Cochrane, Medline, Psychinfo, Web of Science Core Collection, and ERIC) were searched systematically from inception to February 2022. Study selection was conducted independently by two review authors. Information pertaining to study characteristics (year of publication, country, diagnosis, age span, gender distribution, design, and research question, and definitions of absence) and quantitative and qualitative data related to absenteeism was extracted. Overarching themes in the accumulated body of research were identified and synthesized narratively.

Results: After removal of duplicates, 4,940 records were screened. From these, 529 full-text documents were assessed for eligibility. A total of 36 eligible reports from 32 distinct studies were identified. All studies were conducted in high-income countries, and 27 were published in the last decade. Three major themes were covered by the literature: occurrence, contextual factors, and interventions. The results of several studies, including some large-scale population-based studies, clearly suggest that autistic children and adolescents are at increased risk of chronic school absenteeism. Bullying and psychiatric comorbidities were identified as major risk factors. There were no conclusive results concerning the effect of inclusive education on school attendance, and authors underscored the need to distinguish placement in mainstream classes from real participation (e.g., time for instruction as well as time spent with peers). The few available studies on targeted interventions were based on small numbers of participants, but some promising results were reported.

Conclusions: School absenteeism is a major challenge for autistic children and adolescents and their families, often arising in a context of other developmental, health-related, and psychosocial problems. There is a need for larger and more robust studies on early detection and intervention. More research is also needed on the mechanisms leading to and maintaining school absenteeism in this specific group of students. It is also important to shed more light on the situation in low- and middle-income countries.Awaiting more research, schools should adapt well-researched pedagogical strategies and make necessary accommodations in the learning environment to promote school attendance among children and adolescents on the autism spectrum.

426.376 (Poster) Simulation-Based Education for Teaching Aggression Management Skills to Health Care Providers in the Acute Health Care Setting: A Systematic Review

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Background: Aggression demonstrated by patients in acute care hospitals is frequent and costly with nurses working in emergency departments and paediatrics at high risk of experiencing patient violence. Behavioural emergencies caused by young people in paediatric hospitals are sufficiently frequent to require prioritisation as a global child health hazard. Children with additional needs, including autism, account for nearly half of all incidents in one Australian tertiary hospital. In addition, data is emerging in Australia that children presenting to emergency departments for behavioural crises have increased during prolonged periods of lockdown of the Covid-19 pandemic. The healthcare costs of behavioural emergencies are high with injuries to patients, families and staff, reduced work attendance and health care presentations also common. Acute care staff are often not trained or confident in the prevention or management of aggression or high-risk behaviours. Specifically, paediatric clinicians report a lack of knowledge and understanding of children and young people with a history of aggression and complex communication needs who are at high risk for aggressive and externalising behaviours. A range of training modalities have been described for acute care staff, including didactic lectures, written and web-based learning modules and simulation-based education. Simulation-based education has been found to be superior to traditional clinical medical education for clinical skill acquisition and is gaining acceptance as a training method for teaching skills in managing clinical aggression.
Objectives: The aim of this systematic review was to assess the effectiveness of simulation-based training for increasing de-escalation knowledge, skills and behaviour of staff working in the acute care setting. A broad search was conducted as there were insufficient publications about autism-specific simulation interventions.

Methods: We designed, registered and published a study protocol for a systematic review of studies evaluating simulation-based training for the management of patients with aggression in the acute health care setting. Comprehensive searches were conducted in PubMed, MEDLINE, PsycINFO, CINAHL and The Cochrane Library. Two reviewers independently screened all records, extracted data and assessed risk of bias. The primary outcomes included patient outcomes, quality of care, and adverse effects. Secondary outcomes included workplace resource use, healthcare provider related outcomes, knowledge (de-escalation techniques), performance, attitudes, and satisfaction. A narrative synthesis was performed for included studies.

Results: Our search strategy yielded 16099 records with 101 undergoing full text review following abstract screening. Nineteen studies met inclusion criteria and were included in this review. Three studies were RCTs with the remainder pre-/post-test cohort design. All but one study combined simulation-based education with at least one other training modality. There was substantial variation of interventions and outcome measures used in included studies, thus a narrative synthesis of results was performed.

Conclusions: Simulation-based education is an acceptable training format for teaching acute health care staff how to manage clinical aggression and has positive impacts on knowledge and self-reported confidence. However, there is a lack of information about the magnitude of these positive effects and impact on patient outcomes. The findings are of relevance to autistic children, providing an opportunity to reduce harm during their hospital presentations and admissions.

426.377 (Poster) Support in Daily Living for Young Adults with Neurodevelopmental Conditions in Sweden: A Qualitative Description of Current Practice
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Background: The transition to adulthood is a phase where young people are increasingly expected to navigate life themselves, adapt to societal roles and expectations, and eventually achieve milestones such as leaving their parental home, completing their education, or finding a job. In Sweden, young adults with neurodevelopmental conditions are increasingly receiving a practical, educational, and social support service called housing support. This service aims to enhance the individual’s autonomy and ability to manage their everyday life, within the home and community. However, no detailed guidance is currently available on how this support should be delivered.

Objectives: A better understanding of current practice is needed, to guide policy and practice toward an equal and efficient provision of support. This study aimed to provide a qualitative description of support workers’ views on housing support services delivered to young adults (age 18 to 29) diagnosed with autism and/or ADHD.

Methods: In-depth interviews were conducted with 34 housing support workers from 22 municipalities, differing in size and geographic location, across 19 Swedish regions. An open-ended interview guide comprised questions focusing on the support workers’ perceptions of support needs, support delivery, and factors influencing the support for this specific target group. Follow-up questions regarding the impact of the COVID-19 pandemic were also included. An inductive qualitative content analysis approach was used, in which meaning units were identified, labeled with codes, and grouped into subcategories, categories, and main categories.

Results: The interviews depicted a complex service, subject to organizational aspects (roles responsibilities, availability, and allocation), the joint effort of multiple key players (the young adult, relatives, support workers), and the diverse and heterogeneous nature of the core components (finding common ground for work, establishing productive collaboration, and specific skills/methods used). Current practice was partly determined by organizational needs (e.g., staffing, working hours, and means of transport), without fully considering the specific needs of the target group. Similarly, while general strategies such as motivational interviewing were used, no tailored approach for the target group was described. The support workers also found it challenging to be supportive without being directive, and to incorporate the young adult’s objectives and self-determination in the support provision. While service delivery clearly was disrupted by the COVID-19 pandemic, this sometimes led to new insights that may be utilized in the future development of housing support.

Conclusions: Findings raised important questions regarding how housing support should be organized and delivered to strike the right balance between providing necessary supports and promoting autonomy, meeting the target group’s specific needs across the various stages of transition, and providing an equitable service across municipalities. Increased standardization of service elements and detailed guidelines at a national or regional level will likely be key tools in translating best practices and evidence into a sustainable model of housing support for neurodivergent young adults.

426.379 (Poster) The Association of Family Characteristics and Clinicians’ Use of Caregiver Coaching in Early Intervention
Results: The questionnaire items were shown to be invariant across participants from both degrees and specialties at the configural, metric, and strict levels. Pre-service teachers showed generally positive attitudes towards inclusion, especially in relation to its benefits for students with ASC. Subsequently, invariance between groups was tested according to degree (pre-primary educators vs. primary teachers). Finally, latent means were compared between groups. Adequate alpha ordinal and McDonald’s omega reliability indices were obtained (ordinal α = .88, ωt = .92).

Methods: A total of 350 pre-service teachers (287 women) between 18 and 52 years of age (M = 20.99, SD = 3.68) were surveyed using an adaptation of the Attitudes of Regular Educators toward the Inclusion of Students with Autism Spectrum Disorder questionnaire. The analytic process was carried out in three phases. First, the internal structure of the questionnaire was tested by confirmatory factor analysis on the polychoric correlations matrix between items and three factors were identified that explain 52 % of the common variance: beliefs, benefits, and training for the inclusion of students with ASC. Subsequently, invariance between groups was tested according to degree (pre-primary educators vs. primary school teachers) and specialisation (special educational teachers vs. primary teachers). Finally, latent means were compared between groups. Adequate alpha ordinal and McDonald’s omega reliability indices were obtained (ordinal α = .88, ωt = .92).

Results: The questionnaire items were shown to be invariant across participants from both degrees and specialties at the configural, metric, scalar, and strict levels. Pre-service teachers showed generally positive attitudes towards inclusion, especially in relation to its benefits for

Background: Autistic children of color and of lower socioeconomic status (SES) often do not receive the same quality care as do their white or higher SES peers (Mandell et al., 2002; Mandell et al., 2007; Begeer et al., 2009). Qualitative studies find that community clinicians may choose not to coach caregivers from minoritized backgrounds in using evidence-based interventions (EBI) (Tomczuk et al., 2022). To date, however, no quantitative studies have examined whether family characteristics affect whether clinicians coach caregivers.

Objectives: We assessed if clinicians, trained in an evidence-based, caregiver-mediated intervention, differed in their implementation of the intervention as a function of family income, education, race, ethnicity, or primary language.

Methods: Family characteristics such as caregiver education, race, and ethnicity, income-to-needs ratio (King et al., 2020), and household language were collected as part of a community-based caregiver-mediated pilot randomized trial of an EBI, Project ImPACT (Ingersoll & Dvortcsak, 2009), in partnership with community agencies serving infants and toddlers with autism. Sixty families were recruited and randomized to three conditions: (1) Project ImPACT 4 hours/week (n = 19), (2) Project ImPACT 1 hour/week (n = 23), (3) Control (n = 18). Family SES characteristics included: caregiver education, race, and ethnicity; income-to-needs ratio; and household language. Two outcome measures were used to assess clinicians use of Project ImPACT: Project ImPACT Coaching Fidelity Checklist (for conditions 1 and 2; Ingersoll & Dvortcsak, 2009) and Parent Empowerment and Coaching in Early Intervention Fidelity Checklist (PEACE; Pellecchia et al., 2020). We used multiple linear regression to estimate associations between each SES characteristics and the two fidelity measures, controlling for condition and total intervention time.

Results: Overall fidelity to ImPACT (M = 57 on a 100-point scale, SD = 22) and coaching strategies was low. Family SES in this sample was very low, with 50% of families (n = 30) reporting household incomes under $20,000 USD; over 41% of mothers (n = 25) reported having education less than or equal to a high school education; and over half of fathers (n = 33) reported having less than or equal to a high school education. No family SES characteristics were statistically significantly associated with clinicians’ ImPACT fidelity (p > 0.05). ImPACT Fidelity was higher among clinicians coaching families that spoke non-English languages than clinicians coaching families that spoke English only (p = 0.04; Figure 1).

Conclusions: In contrast to the one qualitative study in this area, we found that family characteristics were not associated with use of one evidence-based practice, and only caregivers’ language was associated with the extent to which the clinician coached the caregiver. Two limitations hamper interpretation of findings: 1) intervention fidelity was, on average, low, and 2) families’ income was very low. The limited variability in these two constructs may have limited our ability to observe an association. Future studies should assess these associations in samples with greater variation in SES. In the interim, future efforts should address structural burdens faced by marginalized communities to successfully implement EBIs.

Background: Pre-service teacher attitudes toward the inclusion of children with Autism into Mainstream Schools

Objectives: The aim of this research was to understand these attitudes to improve the design of training programs for pre-service teachers in higher education.

Methods: A total of 350 pre-service teachers (287 women) between 18 and 52 years of age (M = 20.99, SD = 3.68) were surveyed using an adaptation of the Attitudes of Pre-Service Teachers Toward the Inclusion of Children with Autism into Mainstream Schools questionnaire. The analytic process was carried out in three phases. First, the internal structure of the questionnaire was tested by confirmatory factor analysis on the polychoric correlations matrix between items and three factors were identified that explain 52 % of the common variance: beliefs, benefits, and training for the inclusion of students with ASC. Subsequently, invariance between groups was tested according to degree (pre-primary educators vs. primary school teachers) and specialisation (special educational teachers vs. primary teachers). Finally, latent means were compared between groups. Adequate alpha ordinal and McDonald’s omega reliability indices were obtained (ordinal α = .88, ωt = .92).

Results: The questionnaire items were shown to be invariant across participants from both degrees and specialties at the configural, metric, scalar, and strict levels. Pre-service teachers showed generally positive attitudes towards inclusion, especially in relation to its benefits for...
Background: Currently there are few formalized supports for families and caregivers of autistic youth in navigating sexuality, changing bodies, and other issues related to puberty and adolescence (e.g., Pugliese et al., 2020). There is also evidence of disparities in access to more formal sex education supports for autistic youth (Holmes et al., 2020) and these supports may neglect important topics for autistic individuals (e.g., sensory needs, gender diversity, social safety; Hannah & Stagg, 2016). While parents are often their child’s first sexuality educator, many parents report feeling underprepared and lacking support in having these discussions with their children (e.g., Blakeley-Smith & Nichols, 2009). As such, it is important to consider parent-led sexual health interventions for caregivers of autistic youth in order to mitigate the risk of averse sexual health outcomes and support overall well-being of autistic individuals.

Objectives: (1) Evaluate the initial acceptability and feasibility of a novel parent-led sexual health program and (2) Evaluate changes in knowledge of core content, parent self-efficacy in discussing issues related to sexuality with their child, and expected outcomes of discussing sexual health topics with their child.

Methods: Two separate groups of parents of autistic youth (ages 10-13 and 14-18, respectively) were recruited to participate in the Birds & Bees pilot program. Eligible parents attended a 90 minute telehealth group for 8 weeks (see Table 1 for content areas). Participants completed the Parent Knowledge Questionnaire, the Parent Self-Efficacy Scale (PSES; DiLorio et al. 2006) and the Parenting Outcome Expectancy Scale (POES; DiLorio et al. 2001) pre- and post-treatment. Parents also provided feedback regarding overall acceptability of the program. The first cohort of parents consisted of mothers (N=4; mean age= 39 years) who had cisgender autistic sons (N=2) and daughters (N=2) (mean child age= 10.5 years). Six parents have been recruited to begin cohort 2, which is anticipated to end in December 2022.

Results: Preliminary results indicate that acceptability for the Birds & Bees program was high on the parent feedback form, with all participants endorsing that they strongly agreed or agreed with their overall satisfaction and perceived helpfulness of the program. Parent knowledge was high both pre- and post-treatment, yielding medium effect sizes following the intervention, Cohen’s d = .55 (-0.93 - 3.75). Parent self-efficacy also demonstrated positive initial effects, Cohen’s d = .50 (-1.67-3.36) as did parent outcome expectations, Cohen’s d = .68 (-0.85-3.54). See table 2 for additional details. Full results including both cohorts are forthcoming.

Conclusions: Overall, the Birds & Bees pilot program demonstrates promising initial acceptability and changes in outcomes for parents of autistic youth. Parents found the group to be helpful and displayed positive trends in their content knowledge, self-efficacy and outcome expectancies in serving as sexuality educators to their children. Implications of these results illustrate the positive impact of an innovative parent-led sexual health program for caregivers of autistic youth. Limitations include the small sample size, which limits the ability to measure more robust changes pre and post intervention.
Objectives: The objective of the study was to evaluate the convergent validity of the RITA-T.

Methods: Our sample comprised 100 children aged between 18 and 36 months referred to a diagnostic clinic for an assessment of ASD or global developmental delay (GDD). The M-CHAT, the RITA-T and the Autism Diagnostic Observation Scale, Second Edition (ADOS-2) were administered as part of the diagnostic evaluation process. Descriptive and statistic analyses were performed (e.g. means, standard deviation, min/max, correlations).

Results: The data collected indicate that the RITA-T is able to discriminate children with ASD from children without characteristics associated with this developmental disorder. In addition, this tool correlates positively with the (ADOS-2).

Conclusions: Based on the results of this study and previous studies, the RITA-T could help optimize a service pathway by identifying children with ASD symptoms earlier.


Background:

Recognition of autistic doctors is a recent phenomenon. Little research exists on their experience in the medical profession. This study aims to fill that gap.

Objectives:

Describe the professional experiences of autistic doctors, identify key areas of need, and highlight priorities in research.

Methods:

A cross-sectional survey, adapted from an autistic school staff survey, was delivered via Facebook and WhatsApp to an online, invite-only group of over 550 autistic doctors. Participants provided quantitative and qualitative data on topics including disclosure, mental health, career outcomes, and beliefs about autism.

Results:

We received 225 responses from autistic doctors. See Table 1 for demographics. 64% had a formal diagnosis of autism, with 6% diagnosed in childhood. The mean age of formal diagnosis was 36 (range 3 – 61, median 36.5).

Most respondents were currently working as doctors (82%). Most common specialties were general practice / family medicine (31%), followed by psychiatry (18%) and anaesthesiology (11%). Some previously worked as doctors but were not currently practising (14%) or never worked as doctors (4%). Almost half of those working had completed specialty training (46%), 40% were current trainees. Of those with a childhood diagnosis, seven were currently working as doctors with one yet to start.

Of the 80% who responded, 73% agreed that that “being autistic helps me in my work as a doctor” while only 10% disagreed. However, 62% reported that being autistic was also a disadvantage in the workplace. Advantages cited included attention to detail, increased empathy and connection with patients, diligence, and pattern recognition.

80% reported having worked with another doctor they suspected was autistic, but only 22% had a colleague they knew was autistic. Having never worked with another potentially autistic doctor was significantly associated with having considered suicide. Most preferred “autistic doctors” (64%) rather than “doctor with autism” (18%) or “doctor on the autistic spectrum” (28%). Most considered autism as a difference (83%); a majority also considered it a disability (52%) or an identity (54%). Just 13% considered autism a disorder, but of those who did, twice as many had attempted suicide (p=0.019, 43% vs 21%). Considering autism a disorder was significantly associated with preference for the term “doctors with autism” (P<0.001).

Half had engaged in self-harm (49%), 77% had considered suicide, and 24% had attempted suicide. Only 6 respondents were openly autistic in all workplace settings and 29% had not disclosed to anyone at work. 46% had requested adjustments in the workplace. Changes sought included more manageable workloads, ability to be open about being autistic, changes to the work environment, and flexibility from
empowers. Of those who asked for adjustments, only 49% had them implemented. Negative mental health outcomes were associated with requesting adjustments and particularly with requesting and not receiving those adjustments.

Conclusions:

Many autistic doctors are thriving in medicine and bring important strengths. However, our results suggest they experience significant workplace barriers which may lead to negative employment and mental health outcomes. Research and practice changes are required to facilitate equitable access for autistic healthcare providers.

**426.384 (Poster)** The Impact of the COVID-19 Pandemic on Mental Health and Coping of Parents Raising a Child with Autism Spectrum Disorder


Background: The COVID-19 pandemic abruptly disrupted family life. Families were impacted by unemployment, and loss of childcare supports, in-person social interactions, and educational/clinical services. Several studies have reported pronounced mental health impacts on parents raising a child with a disability, including those who have a child with autism spectrum disorder (ASD). Few, if any, studies have evaluated differences in parental coping strategies between neurodevelopmental groups (i.e., ASD and other developmental disabilities (DDs)) and the role these strategies play in improving parental mental health during the pandemic.

Objectives: The objectives of this study were to: 1) evaluate the differences in parental mental health across three child disability status groups (ASD, DD), and population controls (POP); 2) evaluate differences in parental engagement in coping strategies during the pandemic across the three child disability status groups; and 3) examine the relationship between engagement in parental coping strategies and parental mental health.

Methods: Data were gathered from the Study to Explore Early Development, a large multi-site U.S. case-control study of ASD and other DDs in young children. In the summer of 2020, data from a custom online survey were collected from participants measuring: a) parental mental health (comprised of 4 items from standardized questionnaires: depression, anxiety, loneliness, and trauma-related symptoms); and b) parental coping skills (a checklist of 9 activities, such as meditation and spending time outdoors) that were practiced in response to perceived stress during COVID-19. Bivariate (ANOVA, Chi-Square) and linear regression models were employed in the analyses. Tukey’s Honestly Significant Difference Test was used for post-hoc comparisons.

Results: A total of N = 1019 parents, 98% of which were biological mothers, of children in the ASD (n = 269), DD (n = 366), and POP (n = 384) groups were included in this study. There were significant differences in mental health among the three groups (F = 7.29, p < .001), with parents of children in the POP group (m = 22.94, sd = 7.69) having significantly better mental health (higher scores are worse) than parents of children in the ASD (m = 25.35, sd = 8.67) and DD (m = 24.35, sd = 8.15) groups. There were also significant differences in parental coping between the three groups (F = 18.53, p < .001), with parents of ASD children (m = 4.08, sd = 1.90) engaging in significantly fewer coping strategies than those in the DD (m = 4.87, sd = 1.86) and POP (m = 4.86, sd = 1.77) groups. However, parental coping was not associated with parental mental health (t = 1.01, p = 0.32).

Conclusions: Our findings show parents of children with a neurodevelopmental disability experienced worse mental health than those raising a child without a neurodevelopmental disability during the COVID-19 pandemic. While coping skills were lower among the ASD group, it was not associated with parental mental health. Further research is needed to understand the best strategies to improve the well-being of parents of children with ASD, and those with other DD, in the current and future pandemics.

**426.385 (Poster)** The Pediatric Care Network Autism Program at Children’s Hospital Colorado: Educating and Supporting Primary Care Providers to Expedite Identification and Care of Autistic Youth

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Background: Families seeking specialist evaluations for autism spectrum disorder (ASD) face long delays. There is an increasing need for medical and mental health professionals to accurately assess and support families with ASD concerns (Hyman et al., 2020). Primary care
providers (PCPs) are often the first line of referral for children with developmental delays but have reported inadequate training and lack of confidence related to diagnosing ASD and supporting their healthcare needs (Self et al. 2015). Although programs have been developed to increase PCP knowledge and confidence in ASD diagnosis (Mazurek et al., 2019), few training initiatives exist within the state of Colorado. The Children’s Hospital Colorado’s Pediatric Care Network (PCN) Autism Program was developed to address this need, partnering with community PCPs to coordinate physician trainings and ultimately create an expedited assessment model, which leverages telehealth and consultation practices, to better serve families efficiently and comprehensively.

Objectives: This pilot feasibility study (1) assessed PCP satisfaction and changes in knowledge, confidence and practice post training; and (2) explored preliminary outcomes of patients seen through an expedited telehealth consultation clinic.

Methods: 163 PCPs across 19 practices and 16 counties completed the 4-hour PCN Autism Program training provided by clinical psychologists. Post-training surveys were administered to assess provider knowledge, confidence, satisfaction and practice changes. Paired samples t-tests analyzed retrospective review of pre- and post-training changes. In phase 1, PCPs were trained to conduct ASD-specific developmental histories that accompanied their referral to an expedited list for comprehensive assessment with the clinical psychologist. In phase 2, a telehealth consultation model was introduced that used the PCP’s developmental history to identify patients who might require fewer face-to-face hours for an evaluation. Patients seen in Phases 1 and 2 (n=188 and 16, respectively) ranged in age from 2 to 20 years. Chi-square analyses were used to compare patient characteristics across groups requiring more vs. less face-to-face contact hours.

Results: A subset of PCPs (n=43; 33%) completed post-training surveys. PCPs reported increased confidence and knowledge regarding ASD identification and care, as well as high rates of acceptability and satisfaction with the educational materials (see Figure 1). Significant increases were seen in frequency of PCP’s concern for ASD (t[38]=-3.38, p=.002) and frequency of consultations with hospital specialists (t[38]=3.16, p=.003). In phase 2, the average face-to-face time with families was 5.2 hours (SD=2.1), compared to the 8-hour standard in the comprehensive evaluation model. Those requiring 4 or fewer hours of direct contact (n=7, 43.8%) were more likely to have a sibling with ASD (X2(1,16)=3.88, p=.049) and carry a provisional or educational diagnosis from a community provider (X2(1,16)=8.9, p=.003). PCP identification of suspected diagnosis (n=12) was confirmed in 100% of the cases seen by the clinical psychologist.

Conclusions: The PCN Autism Program is an innovative approach for improving the knowledge and confidence of PCPs in supporting families of autistic youth. Our pilot consultation model also suggests that information provided by the PCP may help predict which patients need fewer hours with specialists, resulting in increased efficiency for both specialists and patients.

426.386 (Poster) The Perspective of Autism Spectrum Disorders Caregivers about COVID-19 Lockdown: Repercussions in the Brazilian Population


Background:

The COVID-19 lockdown has posed new challenges for individuals with autism spectrum disorder (ASD), including school and services suspension, besides reductions in support with different consequences around the world.

Objectives:

To explore the caregivers’ perspectives on the repercussions of the COVID-19 lockdown on people with ASD in different age groups in Brazil, and to investigate the association between services suspension and changes in ASD behaviors.

Methods:

This cross-sectional exploratory study is part of a multicenter project undertaken by the eighth Latin American countries represented in the REAL collaboration. A convenience sample of 158 caregivers of people with ASD completed the survey in Brazil between June and August 2020. The survey comprises nine sections concerning: general data on the person with ASD; educational attainment before and during the pandemic; home situation during the pandemic; treatments and support at the start of the pandemic; behavioral changes due to sheltering-in-place; going out behaviors; treatment and support during the pandemic and; main concerns during lockdown. Data analysis included central tendency and frequency calculations and inter-group comparisons were made using chi-square tests.
Results:

The ASD sample was comprised of 81% (n = 128) males and divided into three age groups: 1) Early Childhood (n = 47, age 6 years or younger); 2) School-age (n = 97, ages 7 to 18 years) and 3) Adults (n = 13, age >= 19 years). Considering the total sample, 80.3% of the subjects reported that only left the house for essential errands or work; 14% had the school activities suspended and from those who continued with school activities, 62.5% accepted partially or without problems the educational changes. Most caregivers reported “a major” or “some” regression in problems with sleep (63.1%), attention (61.2%), food intake (61.8%), irritability (76.4%) and anxiety (74.5%). When comparing between age groups, the school-age group refused to attend school online more than the rest of ages ($X^2 = 16.4, p = 0.03$). Likewise, the school-age group presented the greatest regression in depressive symptoms ($X^2 = 16.4, p = 0.03$) and attention ($X^2 = 17.7, p = 0.02$). Services suspension occurred for 60.5% of the individuals. Fisher tests associated the increase of attention deficits ($p = 0.04$) as a function of the suspension of services received by people with ASD; no significant increase in internalizing or externalizing symptoms were found in this association.

Conclusions:

Service suspension in Brazil had a negative impact on different domains of the development of children with ASD, including their mental health. The school-age children seem to be the ones who bear the most consequences regarding depressive symptoms and inattention.

426.387  (Poster) The Role of Lived Experience: Autism Identification Among Children with Autistic Older Siblings

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Background: Autism Spectrum Disorder (ASD) is highly inheritable. About 10% of younger siblings of those with Autism are likely to have ASD as well. However, little known is about the age of initial ASD identification among children with autistic older siblings.

Objectives: This study used a large, national healthcare claims database of a privately insured population in the US to investigate the age at initial identification of ASD among children with autistic older siblings as compared to those without autistic older siblings.

Methods: Using the 2005-2020 MarketScan® database, we identified children with ASD based on the diagnose codes, ICD-9: 299.xx and ICD-10: F84.xx. Children who enrolled in the database within one year after birth and had initial diagnosis of ASD before age 8 were included in the study. We defined siblings as those in the same family with £10 years difference in age. Our study cohort was divided into three mutually exclusive groups: ASD children with (1) at least one autistic older sibling; (2) no autistic older sibling(s); (3) no older sibling(s). The age at initial identification of ASD was compared among these three groups, in conjunction with gender, geographic region (by US census region and state), residency (urban vs. rural), type of insurance (HMO, PPO, other types), and year of birth. Descriptive analyses and multivariable regressions were performed to examine the impact of having autistic older sibling(s) on age at initial identification of ASD, among other potential risk factors/confounders.

Results: Our study cohort consisted of 66,726 unique individuals with ASD (Table 1), with 78.3% males and an average length of enrollment in the database of 6.4 (sd: 3.7) years. Among them, 3,615 (5.4%) had an older autistic sibling; 29,514 (38.8%) had no older autistic sibling(s); and 37,197 (55.8%) had no older siblings. Autistic children with older autistic siblings were on average diagnosed at younger ages (mean: 36.8 months, std: 17.0, median: 33), compared to those with only non-autistic older siblings (52.4, 31.9; 42), and those with no older siblings (49.9, 29.5, 41). This pattern was consistent geographically across the US (Figure 1), but there were significant variations among the states. Multivariable regression, having adjusted for gender, year of birth, census region, type of insurance and urban vs. rural residency, showed that, autistic children with autistic older siblings were identified 10.8 months earlier than children with only non-autistic older siblings; and 9.7 months earlier than children with no older siblings (p-values<0.0001). In addition, being male, born in later years, having a PPO plan, and living in urban areas were associated with earlier diagnosis of autism.

Conclusions: Our results show that autistic children with older autistic siblings were identified at an earlier age nationally, but large regional variations were noted. Future studies are warranted to examine the multi-level factors attributed for these differences including potential enhanced family and/or primary care provider sensitivity to development differences.

426.388  (Poster) Title: Teachers’ Perception of Autistic Students: Associations with the Quality of Student-Teacher Relationships and Students’ Socio-Emotional Adjustment

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Background: Autistic adolescents and adults reflecting on their early school experiences have noted that teachers often viewed them from a deficit-based rather than a strengths-based lens (Cohen et al., 2022). The way teachers view students may impact the quality of student-teacher relationships (STRs), which influences students’ emotional and behavioral outcomes (Murray & Zvoch, 2011).

Objectives: To examine teachers’ perceptions of their autistic students (positive, negative, neutral) based on their open-ended descriptions of these students. Further, to examine associations between these perceptions and teachers’ ratings of the quality of their STR and the students’ adjustment.

Methods: This pilot study includes 26 K-2 general education teachers (88.5% female; 53.8% White; 84.0% with Master’s degree; 88.0% without professional training in autism) with at least one autistic student in their classroom. To assess teachers’ perceptions, we coded written responses to the following question: “...take a moment to think about your autistic student...add a few words or word phrases that describe your student...” Responses were coded as positive (e.g., “lovable”), negative or focused on difficulties (e.g., “difficult peer interactions”), or neutral (e.g., “hyper focused on his interests”). The proportion of positive, neutral, or negative descriptions was calculated as well as the ratio of positive to negative descriptions. Teachers rated their students’ socio-emotional adjustment using the Social, Academic, and Emotional Behavior Risk Screener (SAEBRS) and completed the Student Teacher Relationship Scale (STRS) as a measure of their perception of their STR. We examined associations between teachers’ open-ended descriptions and quantitative ratings of STR quality and student socio-emotional adjustment.

Results: Teachers made more negative (M=3.27) than positive (M=2.12) or neutral (M=0.58) descriptions. A greater proportion of positive perceptions was associated with higher STR quality ($r=.47$, $p<.05$) while a greater proportion of negative perceptions was associated with lower STR quality ($r=.57$, $p<.01$). Similarly, a greater ratio of positive to negative perceptions was associated with greater STR quality ($r=.48$, $p<.05$) and teachers with more positive perceptions of their autistic students showed lower student-teacher conflict ($r=-.48$, $p<.05$) and teachers with more negative perceptions showed greater student-teacher conflict ($r=.58$, $p<.01$). The number of neutral perceptions was not associated with STR quality. In regards to students’ socio-emotional adjustment, we found that greater proportion of positive perceptions was associated with better adjustment ($r=.42$, $p<.05$) while greater negative perceptions was associated with lower adjustment ($r=-.54$, $p<.01$).

Conclusions: Our analysis showed that teachers held slightly more negative than positive perceptions of their autistic students. Further, we found that the way teachers view their autistic students may relate to the quality of relationships they form and is associated with students’ socio-emotional adjustment. These perceptions of autistic students may relate to teachers’ attitudes about autism in general, thus underscoring the importance of helping teachers develop affirming attitudes toward autism. Our findings are limited by a reliance on teacher report for STR quality and student socio-emotional adjustment; future research should include observation or child-report measures.

426.389 (Poster) Trained Primary Care Providers Can Diagnose Clear Autism in Toddlers after Screening


Background: With the shortage of autism specialists, it is important to build diagnostic capacity among non-specialist providers when possible. Building capacity specifically for primary care diagnosis in toddlers builds upon the momentum of both early universal autism screening and the common primary care practice of referring families for early intervention. If done effectively, it can reduce the age of diagnosis for this subset of children, support earlier intervention, and reduce the number of families waiting for a specialist diagnostic evaluation.

Objectives: To measure diagnostic outcomes and patient and provider satisfaction after an autism diagnostic evaluation by a primary care provider trained in early autism diagnosis (a PCP Champion).

Methods: Four primary care providers (PCP Champions) in two city primary care practices were trained in identification and documentation of autism using the Screening Tool for Autism in Toddlers and Young Children (STAT) and the Childhood Autism Rating Scale-2 (CARS2). Clinicians within the PCP Champions’ practices referred children who scored 7 or greater (high-likelihood) on the Modified Checklist for Autism in Toddlers (M-CHAT) for a 45-60-minute evaluation with a PCP Champion, followed by a 30-minute feedback session one week later. Children with clear features of autism and who met full diagnostic criteria were given a diagnosis and referred to community-based interventions. Children who did not clearly meet criteria for autism were referred to the Developmental and Behavioral Pediatrics (DBP) specialty program for a specialist evaluation. PCP Champions met twice monthly with autism diagnostic specialists to discuss complex cases, documentation, billing, and community resources.

Variables studied include rate of autism diagnosis, rate of referral for specialist evaluation, average age of diagnosis, connection to autism intervention services, and patient/provider satisfaction.

Results: To date, over our 6-month service, PCP Champions diagnosed 57 of 75 children with autism (76%). Eighteen children (24%) were referred to DBP for further evaluation; 3 received autism diagnoses with DBP and 15 are pending evaluation. The average age at evaluation
was 27.52 months (n=75, 17-41 months). So far, 39 primary clinicians have referred children for this service. The service is ongoing and updated results will be presented, including satisfaction survey results from the parents, referring providers, and PCP Champions.

Conclusions: With an investment in training four providers on the STAT, CARS2, and consultation hours twice per month, PCP Champions have served as a very early diagnostic resource for 39 primary care clinicians over a 6-month period and were able to diagnose approximately ¼ of patients who scored as high-lielihood on the M-CHAT. This has resulted in a timely diagnosis for these children with clear autism and provides a benchmark for the amount of capacity building needed to serve the subset of children with high likelihood scores at screening. It represents one small step in expanding capacity to meet the diagnostic needs of autistic individuals at different points across the lifespan.

426.390 (Poster) Training for University Staff Who Work with Autistic Students

E. Jenks and F. Sedgewick, University of Bristol, Bristol, United Kingdom

Background: Autistic students currently make up ~2.4% of the UK university student population. These students are particularly vulnerable to stressors within a university environment and are more likely to experience poor mental health than their non-autistic peers. Despite this, there is a lack of tailored support for autistic students at university.

Objectives: The current project assesses a training course, co-created with autistic students, staff, and relevant experts, for university staff who work directly with autistic students (e.g. personal tutors, disability support staff, careers advisors). The programme focused on debunking stereotypes, educating about the autistic experience at university, and highlighting the differences in mental health presentation between autistic and non-autistic individuals. It also aimed to provide practical strategies and tips for these staff members to help make interactions with autistic students as accessible and beneficial as possible. The full course was conducted online over the course of five weeks (1-2 hours per week), with a shorter, half-day session (3 hours) provided for staff who could not attend the longer version. In total, 74 staff from three UK universities completed the training (42 full course, 32 half day).

Methods: The Autism Stigma and Knowledge Questionnaire (ASK-Q; Harrison et al., 2017) was administered before and after the training, to examine changes in trainees’ understanding and acceptance of autism and autistic people. Post-training interviews and surveys were also conducted with trainees, covering the impact the training has had on their perceptions of autism, the strategies they found beneficial, and how they will use the materials in future.

Results: There were no statistically significant differences between pre- and post-training scores on the ASK-Q, likely due to ceiling effects as pre-training scores were high for both courses. Thematic analysis of the participant interviews identified four themes: developing nuanced, in-depth knowledge of autism; feasibility and acceptability of the training; implications for practice; and the benefit of hearing autistic voices.

Conclusions: Although ceiling effects meant there were no changes to participant’s knowledge about autism and autistic people statistically, the qualitative data reveals the extensive benefits they gained from taking part in the training programmes. Scoring highly on the ASK-Q did not mean that people could not learn important new information and profit from the course. This more nuanced understanding of autism, and especially the links to and impact on student mental health, led to practical changes in their approach going forwards. Listening to and learning from autistic people was seen as particularly important, highlighting the value of co-production in this realm. Our results also highlight the need for alternative assessment measures for evaluating training effectiveness, as reliance on the quantitative results alone would have missed the subtler, but impactful, changes our participants experienced in the perspectives and practice. This has important implications for professional practice in a variety of contexts, both within higher education and more broadly.

426.391 (Poster) Understanding Information Sharing and Parent Experiences of Latinx Families to Accessing ASD Care within a Family Navigation Model

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Background: Children with autism from ethnically and linguistically diverse backgrounds face numerous barriers to accessing care, particularly Latinx families (Coffield et al., 2021; Zuckerman et al., 2018). In 2019, our team established a statewide Family Navigation Network to connect underserved families to community resources and services. To better understand family utilization of our navigation model and barriers to care encountered after diagnosis, we examined contact notes for 243 Latinx caregivers of children with or at risk of ASD.

Objectives: We qualitatively coded contact notes from care navigation phone calls after clinic appointments for 243 Latinx caregivers of children with diagnosed or suspected autism in order to better understand unique caregiver needs, experiences, and service support surrounding autism diagnosis.
Methods: Families were referred for navigation by a primary care provider or state early intervention provider. Participants included 102 English-speaking and 141 Spanish-speaking Latinx caregivers (94.7% female) of children aged 15 months to 7 years (27.6% female). Navigators contacted families before and after diagnosis to offer resources and listen to caregiver concerns. Contact notes were logged in a REDCap database and input into Dedoose, a qualitative data coding program. Notes were coded through an iterative, ongoing process that yielded three broad content domains: Parent Needs, Parent Experiences, and Service Access. Although the Parent Needs domain included resources that Navigators shared with families, the latter two categories comprised information spontaneously shared by caregivers with navigators during calls.

Results: Mean age at point of referral was 33.6 months (sd: 18.9 months). Families lived in 30 different Tennessee counties, 14 of which are medically underserved areas (46.7%), 11 of which have medically underserved populations (36.7%), and 16 of which are rural (53.3%). Navigators shared information about at least one resource with 73.3% of families. The resources shared most often were handouts on commonly requested topics such as toilet training (28.4%), online educational videos (24.7%), caregiver training workshops (24.7%), school services (22.7%), and a partnering statewide disability support agency (21.4%). As navigators shared resource information, families in turn shared about their experiences. Almost half of caregivers (46%) shared their own questions, feelings, and experiences with the navigation team; 18.1% expressed anxiety, 15.2% expressed knowledge or lack thereof of autism, and 9.9% expressed confusion. Almost half (42.4%) of families reported at least one barrier to care, such as language (8.6%), economic difficulties (8.2%), and technology (7.8%) (Table 1).

Conclusions: Qualitative analysis of contact notes with Latinx families provided insight into caregiver needs and experiences before and after receiving an autism diagnosis for their children. Navigators shared resources with nearly three quarters of families. Families also shared information about their lived experiences with navigators, highlighting the reciprocal relationship of family navigation. Future research should continue to investigate how navigation models can support Latinx families.

426.392 (Poster) Understanding Practice Gaps Among Pediatric Providers for Autism Spectrum Disorder

Background:
Autism spectrum disorder (ASD) is a neurodevelopmental disability that is characterized by persistent deficits in social communication and the presence of repetitive and restricted behaviors. The need for early diagnosis of ASD is critical, as early intervention has been associated with reduced impairments in intellectual, behavioral, and functional abilities. Yet several challenges continue to be associated with early diagnosis, including a lack of parental awareness of symptoms, patient race and household income, and low confidence among clinicians in recognizing ASD due to the heterogeneity of symptoms.[Bishop-Fitzpatrick 2017; Durkin 2017; Zwaigenbaum 2015] Several effective interventions are also available for patients with ASD, and have been associated with improved long-term outcomes.[Hyman 2020] Despite this, pediatricians and other primary care providers have shown low levels of confidence in providing care for children with ASD.[Carbone 2013]

Objectives:
Therefore, understanding clinical practice gaps for clinicians related to the diagnosis and management of ASD can inform the development of education and tools to improve clinician knowledge, competence, and clinical practices.

Methods:
A survey instrument containing 30 multiple choice, knowledge and case-based questions was used to assess participants’ knowledge, attitudes, and confidence in the management of ASD. The survey was available online to US physicians without monetary compensation or charge. Respondent confidentiality was maintained, and the responses were de-identified and aggregated prior to analyses. Data were collected from September 10, 2021 to October 28, 2021.

Results:
In total, 187 general pediatricians, 149 child and adolescent psychiatrists, and 50 neurodevelopmental pediatricians completed all assessment questions. The results demonstrated gaps in the following areas:

Correct Response (%)

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Correct Response (%)
Background: The current crisis in access to autism specialists has amplified existing health equity issues in autism care, resulting in even longer delays in diagnosis and connection to treatment for children coming from under-resourced communities (Kanne & Bishop, 2021; Yingling & Bell, 2019). This has heightened the focus on accessible providers, such as pediatricians and generalists in behavioral health, to manage autism care needs. Yet, these providers report that lack of autism-related knowledge impacts their confidence and willingness to care for children with autism-related concerns (Fenikile et al., 2010). As such, understanding healthcare provider needs and barriers associated with providing competent autism care is critical to improving equitable access to services. To date, insights into provider needs has been largely based on survey data. Our project aimed to extend this literature through analysis of the utilization of our ECHO Autism program at Children’s National, which has been successful in engaging over 400 community providers from primary care, medical and behavioral health disciplines, and early care/educational settings in the DC metro area since 2020.

Objectives: To characterize the needs of providers seeking autism training and supports through analysis of de-identified case-based presentation data obtained through ECHO Autism clinics.

Methods: ECHO Autism programs offer an innovative approach to improving equitable access to healthcare services for autistic individuals and their families by enhancing capacity in the existing medical and behavioral healthcare workforce (Mazurek et al., 2017). Consistent with the ECHO Autism model, we used Zoom to hold virtual “clinics” to provide mentorship and a shared learning forum among a multidisciplinary “hub” of autism specialists and community providers (“spokes”). Clinics ran in 6-month sessions on a bimonthly basis and consisted of case presentations with discussion, and autism-specific didactics. No-cost continuing education credits were provided for attendees and incentive pay was offered for participation in research surveys.

Study data collected included case presentation characteristics such as consult reasons, insurance status, and outcome recommendations. To characterize provider needs, referral reasons were categorized into 13 classifications (See Table 1) and independently coded by two raters with strong inter-rater reliability (87% agreement).

Results: Preliminary results based on de-identified case presentation data from 67 participants indicated utilization of our ECHO program was primarily driven by support needs specific to diagnostic clarification of autism and treatment plan development (see Table 1). Available demographic information indicated at least 68% of cases involved public insurance. Additionally, community providers were offered an average of 6.8 recommendations per case, representing needs from multiple disciplines (e.g., psychology, speech-language pathology, social work, psychiatry, genetics).

Conclusions: This dataset offers an ecologically valid analysis of provider needs and barriers to managing autism concerns without referral to specialty settings, extending the literature which has been largely based on self-report survey data. Our data specifies primary support needs in autism related to identification/diagnostic clarification and outlining next steps for families. Additionally, our outcome recommendation data highlights the complexities of needs in autism and critical role of multidisciplinary frameworks in autism, particularly for providers not practicing in multidisciplinary settings.
Background: Families of young children with autism spectrum disorder (ASD) experience barriers to accessing diagnostic evaluations and evidence-based early intervention services, especially those in under-resourced communities. Many families rely on their state’s Part C early intervention system for these services, but there is variability in service providers’ knowledge and experience with screening and assessment tools for ASD, use of evidence-based intervention strategies, and access to ASD-specific professional development tools and resources. The application of telemedicine to Part C service delivery increases access to services for families and offers a unique opportunity for Part C service providers to participate in diagnostic evaluations, specialty intervention services, and virtual learning opportunities to enhance their knowledge of both evaluation and intervention approaches.

Objectives: We will present outcome data from the development and expansion of a telemedicine service delivery model targeting increased access to early identification and intervention services in under-resourced communities. Key components of this model include a community of practice (COP) for Part C early intervention providers and a telediagnostic evaluation process mediated by the family’s developmental therapist (DT). This project builds on a model that already has served over 1000 families through both traditional and telemedicine models of service delivery since 2014. This expansion focuses on feasibility and acceptability of (1) the DT-mediated telediagnostic consultation and (2) use of COPs to promote knowledge and utilization of evidence-based screening and intervention strategies.

Methods: Participants included 92 Part C providers (across 17 agencies) and 97 families of children <36 months of age showing early indicators of ASD. Providers participated in a one-time training focused on the TELE-ASD-PEDS (TAP), a play-based telehealth evaluation tool. Providers then participated in ongoing monthly COPs focused on evidence-based practices for supporting caregivers. Providers referred children for telediagnostic evaluation and helped facilitate the telediagnostic evaluations by collecting medical/developmental background, actively participating in the telediagnostic evaluation, and providing support to caregivers following the evaluation. We assessed caregiver and provider satisfaction with the telediagnostic model as well as provider satisfaction with COPs.

Results: Caregivers (N=97) were satisfied with the telediagnostic evaluation process (0=strongly disagree,5=strongly agree; mean = 4.59) as were providers (N=92, mean = 4.89). Most providers reported they would recommend the model to other families (93% “strongly agree”). Results also showed that caregivers were satisfied with DT involvement (see Table 1) with providers reporting positive service-related outcomes (see Table 2). After participating in COPs, 92% of providers reported “good” or “excellent” knowledge of ASD to share with others.

Conclusions: These results offer several potential benefits to engaging Part C service providers in both COPs and telediagnostic visits with families. This includes increasing providers’ knowledge of the characteristics of ASD, comfort in talking to families about ASD, and knowledge of evidence-based intervention strategies. Other benefits include increasing caregivers’ comfort with the evaluation process and access to support following the evaluation. Ongoing data collection and analysis will allow for further evaluation of these models to address sustainability and further expansion.

Background: Public health restrictions related to the COVID-19 pandemic challenged clinical programs to find alternatives to usual practices. For extended periods, in-person assessments were not possible, and thus other strategies were needed to maintain access to autism diagnosis. The TELE-ASD-PEDS, developed by Warren and colleagues provided proof of principle that observing a child’s interactions with their caregiver within their home environment could inform ASD diagnoses (Corona et al., 2020). Because the TELE-ASD-PEDS was designed to assess children younger than 36 months, our group developed the Autism Assessment for Preschoolers with Language Element Sequence (AAPLES) to further inform assessment of older preschool children, including those with more advanced language skills. Open access resources for family members administering assessment activities in the home, and the clinician directing the assessment virtually are available online (bit.ly/AAPLES). The AAPLES was introduced at a regional diagnostic assessment program in Alberta, Canada in January 2021.
Objectives:
To evaluate the feasibility of clinical assessment that included the AAPLES, including parents’ and clinicians’ confidence in the diagnostic process.

Methods:
Participants included 10 clinicians (developmental pediatricians and psychologists) and parents of the initial 68 children (aged 39-73 months; male: 73.5%; White ethnicity: 36.8%) who were assessed using the AAPLES, as well as a developmental and medical history. Clinicians rated their confidence in their diagnostic impression (ratings of DSM-5 criteria for ASD, informed by the child’s social-communication, play and other behavioral features observed during the AAPLES) on a 4-point Likert scale (from Completely Uncertain to Completely Certain). Parents also rated their confidence on a 4-point Likert scale (from Not Confident to Very Confident) in the diagnostic process and completed a questionnaire about the assessment experience. Exploratory analysis of factors influencing parent confidence were explored by correlations with family demographics and parents’ questionnaire responses, using Pearson’s rho for non-parametric data.

Results:
Of the 68 children who were assessed, 48 (70.6%) were diagnosed with ASD and 6 (8.9%) were felt not to have ASD. For 14 (20.6%) the clinician was uncertain. Overall, 48 of 59 parents (81.4%) were confident or very confident in the assessment findings, whether or not child diagnosed with ASD. Parental confidence level was not related to diagnosis ($X^2(9) = 2.37, p = .99$), nor ethnicity ($X^2(24) = 23.33, p = .50$), or household income ($X^2(30) = 37.53, p = .16$). Parental confidence level was positively related to self-report on being respected as experts and how the AAPLES activities allowed their child to show their skills, based on correlations with questionnaire items.

Conclusions:
Virtual assessments that included the AAPLES supported clinicians to confidently determine whether or not diagnostic criteria for ASD were met in about 80% of this sample of clinically referred children. Parents’ expressed high levels of confidence in the process. Although further evaluation of agreement with in-person assessment is needed, virtual assessment appears to be a viable option to support preschool ASD diagnosis.

426.396 (Poster) What Autistic Adults Want from Post-Diagnostic Support
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Background:
Knowledge and understanding of how autistic adults are best supported following an autism diagnosis in adulthood is poor and the post-diagnostic support available varies greatly. There is widespread recognition that post-diagnostic support for autistic adults requires improvement but there is a lack of consensus on what exactly this should involve. Traditionally, post-diagnostic support services have been designed and commissioned by non-autistic professionals. This risks services not meeting the needs of the individuals they are trying to serve. Considering the perspectives of autistic adults, and establishing whether there is consensus on what post-diagnostic support should involve, is therefore essential to designing optimal post-diagnostic support services.

Objectives:
To identify what autistic adults in the UK think post-diagnostic support should involve. The aim of this study was to provide a bank of consensus priorities, ranked in order of agreement, that can inform future service design.

Methods:
Initial statements were co-produced via a workshop involving 10 autistic adults diagnosed in the UK within the last 10 years. These statements were then presented to a larger cohort of autistic adults and modified further via a series of online questionnaires in a three-round modified Delphi study.

Forty autistic adults completed all three rounds of the modified Delphi study (21 Female; 11 Male; 5 Non-binary; 1 Gender non-conforming; 1 Questioning*, 1 Prefer not to say). The ethnicity of the participants was 0 Black; 1 Asian; 32 White; 4 Mixed-heritage; 1 Arab*, 2 Prefer not to say. Sixteen identified as LGBTQ+, 20 identified as non-LGBTQ+, 4 Preferred not to say. *Categories added by participants.
In each questionnaire round autistic adults were asked what post-diagnostic support should involve. Delphi allows for an understanding of which views are consistently held by community members. Final questionnaire items were organised into six topics: (1) delivery of support; (2) emotional and psychological support; (3) person-centred support; (4) supporting relationships; (5) practical support; and (6) support understanding autism.

Results:

One hundred and fifty-three priorities were identified and, of these, 30 reached or exceeded the consensus threshold of >80% of respondents being in agreement or strong agreement that the item describes an important element of post-diagnostic support. The top items were: Access to professionals with specialist up-to-date training on autism; Help with self-empowerment; Includes support to process the impact of a late diagnosis; Help with autistic fatigue; Access to mental health professionals with specialist knowledge of autism; My support plan would take into account my coexisting conditions (if appropriate); Support takes into account my communication and contact preferences; The option to access support immediately post-diagnosis.

Conclusions:

This study provides consensus-driven guidance on key priorities for post-diagnostic support for autistic adults. It is clear that a holistic approach involving knowledgeable professionals who can help individuals to process the meaning of their diagnosis and enhance self-empowerment would be valued. Broadening a traditional understanding of experts within Delphi studies beyond those with clinical expertise to include those with lived experience is a step towards delivering inclusion in autism research and provides an important evidence-base for service design.

426.397 (Poster) What Factors Help or Hinder Autistic Adults’ Experiences with Therapies and Health Services?: A Qualitative Study

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Background: Autistic people experience mental health problems at significantly higher rates than the general population (Lai et al., 2019). They also face barriers accessing needed therapies/services to support their mental and physical health (Adams & Young, 2020). Those that do access therapies/services report that they fail to meet their needs (Nicolaidis et al., 2013). Considering the high rates of mental health problems, accessible therapies/services that meet autistic people’s needs are essential. There is some knowledge about autistic adults’ experiences with therapies/services, yet less is known about their subjective experiences with accessing these services.

Objectives: This study aimed to analyze autistic adults’ experiences with therapies/health services as reported by autistic people themselves.

Methods: Participants were 53 autistic adults between the ages of 18 and 67 years ($M_{age}=33.38$, $SD=11.15$; 58.5% women). Most participants were white (77.3%), had a post-secondary degree (52.8%), and had a mental health (90.6%) or medical (71.7%) condition. Participants reported the specific therapies/health services they were previously or currently involved in and how many hours they spend per month participating in each therapy/health service. Participants answered an open-ended prompt asking them to describe their overall experiences with these therapies/health services, asking them to highlight their positive and negative experiences. Thematic analysis was conducted following the framework of Braun and Clarke (2006).

Results: Two core themes were identified: 1) Factors that Help and 2) Factors that Hinder. Five subthemes were identified for Factors that Help: 1) therapies/health services for autistic and disabled people are available/accessible, 2) reduced symptom severity/improved quality of life, 3) personal attitudes towards therapies/health services (e.g., viewing a specific therapy/health service as effective), 4) interpersonal support (e.g., family, teachers, peers), and 5) therapist/provider characteristics (e.g., patience, validation, collaboration, or knowledge of autism/neurodiversity). Six subthemes were identified for Factors that Hinder: 1) lack of/no resources/services for autistic and disabled people (e.g., inaccessible), 2) no changes in symptom severity/quality of life, 3) adverse physical side effects (e.g., medication dependence), 4) adverse psychological side effects (e.g., PTSD, stigmatization), 5) lack of interpersonal support (e.g., family, teachers, peers), and 6) therapist/provider characteristics (e.g., lack of patience, validation, collaboration, or knowledge of autism/neurodiversity).

Conclusions: The findings reveal the unique factors that either promote or hinder autistic adults’ positive experiences with therapies/health services. The findings can inform therapies/health services for autistic adults to ensure that appropriate supports are available that meet their needs. Therapists who are accepting, validating, collaborative, and have knowledge about autism/neurodiversity can facilitate a more accessible therapeutic environment. Thus, more training opportunities on autism/neurodiversity that are informed by autistic people’s experiences should be developed and made available for service providers. This can help refine service provision to be more effective and, in turn, promote better mental health outcomes for autistic people. A strength of this study was gathering information directly from autistic adults in their own words. A limitation is that participants were predominantly white, women, and had a post-secondary degree. Future research should include more gender diverse and culturally and economically varied samples.
Background: Universal developmental surveillance of infants and toddlers is the best practice for the early detection of autism; though, inequitable access to early identification is evident globally. Previous research has identified differences in the rates and likelihood of autism between racial, ethnic, and socioeconomic groups, with evidence indicating that maternal factors are also influential in autism prevalence rates (Becerra et al., 2014). However, there is a dearth of literature examining potential differences in engagement in early autism identification research between different ethnic groups and rates of autism in comparison to the wider community.

Objectives: To understand the relationships between child ethnicity and maternal demographics and engagement in early autism identification research and autism prevalence.

Methods: This is a retrospective analysis of data from the Social Attention and Communication Surveillance-Revised study (SACS-R; Barbaro et al., 2022). Conducted in Melbourne, Australia, 126 maternal and child health (MCH) nurses from eight local government areas (LGAs) monitored 13,511 infants and toddlers aged 11-30 months for the early signs of autism. MCH nurses used the SACS-R tool during 12-, 18-, 24- month health checks and the Social Attention and Communication Surveillance Preschool (SACS-PR) at the 42-month health checks. Children who were identified with a “high likelihood” of autism were offered a free developmental assessment by the study team. In this study, we compared participating children’s ethnicity background (European, Non-European, and Mixed) and maternal educational attainment, language(s) spoken at home, socioeconomic status, and autism incidence with that of the greater population from the family’s home LGA, using 2016 census data (Australian Bureau of Statistics, 2020).

Results: 523 children were referred for a free developmental assessment. Of the 357 (68.26%) children who attended the assessment, 95.2% (n = 340) had maternal ethnicity data available. Overall, there was no difference between the proportion of participating mothers who were born overseas and the proportion of residents of the relevant LGAs who were born overseas. No differences were observed between maternal ethnicity groups for maternal education and annual family income. However, differences between child ethnicity groups were observed for maternal employment status, with non-European children (n = 41, 48.8%) more likely to have mothers in current employment compared to those in the European (n = 113, 46.9%), and Mixed-Ethnicity (n = 6, 40.0%) groups (p=0.025). Multilingualism was significantly higher in children of non-European ethnicity (n=49, 58.3%, p=0.000) compared to children of Mixed or European ethnicity. Of the participating children, 257 (75.6%) received a diagnosis of autism, with the remaining 183 (24.4%) children having developmental and/or language delays. Autism prevalence was higher in non-European children (n = 69, 82.1%) compared to those in the European (n = 181, 75.1%), and Mixed-Ethnicity (n = 7, 46.7%) groups (p=0.012).

Conclusions: Research engagement was associated with the child’s diagnosis of autism, multilingualism, and maternal employment status and not maternal country of birth, maternal education attainment, or family income.

Objectives: To explore how autistic children experienced telehealth OT during the pandemic, through the narratives of their parents and treating OTs.

Methods: This secondary analysis is part of a larger qualitative study that investigated how clinic administrators, OTs, and parents of autistic children experienced the sudden shift to telehealth OT during the pandemic. For this secondary analysis, we attempt to address a limitation of the larger study, namely, that the perspectives of the autistic children themselves were not collected directly. We utilized semi-structured narrative interviews with 10 participants (6 OTs and 4 parents of autistic children) who were initially recruited from 3 Los Angeles area pediatric community-based clinics. Interviews took place between April and November 2021. For this secondary analysis, an autistic team member (first author) coded the transcripts using Braun and Clarke’s (2006) thematic analysis (theoretical, semantic, essentialist/realistic approach), using a narrative approach of keeping stories intact. We looked for parent and OT stories about the children’s experiences (observed behaviors, and expressed emotions and perspectives). To increase rigor and social validity, we discussed the codes with other autistic coauthors, and resolved all differences.
Results: We found 3 major themes: 1) Adjusting to Telehealth; 2) Challenges with Telehealth and; 3) Benefits of Telehealth. Participants described that autistic child clients underwent varying processes to adapt to the transition from in-person to virtual OT. Common challenges included disruption to their previous routines, confusion with the technological interface, difficulty focusing on virtual therapy, and regression in some therapeutic goals and/or developmental milestones. Common benefits that clients experienced included developing greater autonomy, feeling increased comfort within their home environment, and receiving greater therapeutic involvement from caregivers. For example, some children appeared to feel empowered to indicate when they needed a break, e.g., by shutting the laptop (compared to in-person treatment where they were unable to leave the physical space). The safety of the home setting seemed to facilitate greater therapeutic gains, such as being able to explore more foods alongside the beloved family dog. Despite the barriers, children successfully adapted to telehealth during the pandemic, and their experiences were overall positive.

Conclusions: This secondary analysis of a larger qualitative study aims to correct the tendency in autism research to exclude the direct experiences of autistic children. Although a noted limitation is that the parents’ and OTs’ perceptions are not an exact proxy, they provide a starting point in understanding how the children experienced telehealth OT. Findings are relevant for policy efforts to provide accessible means of service delivery for autistic children, such as having choices between in-person and telehealth.

426.400 (Poster) “Leery of Diagnosis:” Expert Interviews Describe Barriers to Autism Support in Underserved Metro Atlanta Communities
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Background: Consistent with overall public health estimates, children in the Metropolitan Atlanta (USA) area inequitably have access to autism diagnostic and support services. A delay in identification can have significant impacts on intervention and outcomes for the child and can exacerbate social, racial, and economic inequities. Many of these children spend a significant amount of their day in childcare services, but to our knowledge, no studies currently exist that have sought the perspective of childcare professionals on the barriers that interfere with obtaining evaluation or treatment for autism in young children.

Objectives: To investigate causes of delay or deterrence from autism evaluation or support services in children under 5, in underserved communities in the Atlanta Metro Area. This study also sought to identify potential solutions to these barriers from the perspective of experienced childcare directors.

Methods: A series of interviews were conducted with experienced childcare directors (n=11) specifically working in underserved neighborhoods across the Atlanta Metro region. Participants were identified through the Georgia Department of Early Care and Learning childcare registry and recruited by phone or email, and were sampled from private, school-based, and Head Start daycares. Qualitative analysis of trends was conducted using NVIVO. Participants filled out a brief demographic survey then answered questions about the following topics: barriers preventing equitable evaluation and diagnostic access, barriers preventing equitable support service access, factors on which children are differentially affected by these barriers, and what potential solutions may address these concerns.

Results: Saturation was generally reached after 6 interviews except for additional ideas from an outlier daycare from a more rural area. All 11 childcare directors (100%) mentioned parental resistance or denial as a significant factor influencing equitable access to evaluation. Limited caretaker knowledge and lack of healthcare provider recognition or referral were cited by 8 directors (76%). Among barriers to accessing autism services, proximity of services to families was cited most commonly (82%) followed by caretaker knowledge about services available (76%). When asked about factors common to children impacted more severely by these barriers, directors had less of a consensus. Directors most mentioned that black children were more likely to be impacted (64%) while Hispanic ethnicity was not considered to be a barrier. Many solutions were suggested to address these barriers, with nearly all directors (91%) stating that having diagnostic or supportive services available in the childcare setting where the children spend their days would be beneficial and a strong majority suggesting parental education and support as a viable solution (82%).

Conclusions: Childcare directors had considerable insight into families’ experience with the autism assessment and support process. They identified known factors but also suggested additional influences contributing to the enduring disparities seen in the Atlanta Metro area, and many actionable solutions. Education and support to overcome parental resistance, as well as local availability for evaluation and supportive services, should be a primary focus among policy makers.

426.401 (Poster) An Interpretive Phenomenological Analysis of the Experiences of Autistic Psychiatrists: “If We Can't Recognize Ourselves, How Can We Diagnose Autistic Patients Accurately?”
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Background:
Recognition of autistic physicians is a recent phenomenon and open disclosure remains rare. Insights from autistic physicians in all specialties, but particularly psychiatry, have potential to reframe our understanding of autism and improve healthcare outcomes for autistic people.

Autistic Doctors International (ADI) is a peer support and advocacy group for autistic doctors. Psychiatrists are the most over-represented specialty in ADI, second only to general practitioners in term of numbers. Psychiatrists are among the least likely to either pursue a formal diagnosis or to disclose a diagnosis of autism.

Objectives:

We investigated the perspectives of autistic psychiatrists, with a particular focus on decisions relating to or experiences of disclosure.

Methods:

As an autistic-led research team, we conducted a qualitative study. Interpretive phenomenological analysis (IPA) was used. IPA is a qualitative research methodology with an idiographic focus, which seeks to understand how participants make sense of their own experiences. It is particularly well suited to insider researchers.

Purposive sampling was employed. Participants were members of “ADI Psych”, a subgroup of Autistic Doctors International for autistic psychiatrists. Loosely structured interviews were conducted online and recordings transcribed verbatim.

Results:

Eight participants took part: six consultant psychiatrists and two specialty doctors. Ages ranged from mid 30s to late 70s. Two identified as male, six as female. All lived in UK, predominantly in England. Four were child psychiatrists, four worked in adult services including liaison & old age psychiatry. Seven were in current practice at the time of the study and one was retired. Two participants had a formal autism diagnosis received in adulthood, one had a childhood PDD-NOS diagnosis and self-identified as autistic as an adult, and the remaining 5 self-identified as autistic. None were openly autistic in all settings.

Analysis resulted in 6 group experiential themes and 28 individual subthemes. See table 1 for selected themes and illustrative quotes.

Themes include the journey to autistic identity, considerations around pursuing formal autism diagnosis, cultural barriers to disclosure within psychiatry, perceptions of autism, and stigma. Insights into autistic people as patients, current autism services and autism research were explored along with the personal cost of making change.

“You read all those papers about... autistic people having no empathy and no theory of mind... is that really me? So, if it's not me, does that mean that I'm not actually autistic or... this paper is actually very wrong... which one is it? There's a lot of... cognitive dissonance going on” (Lisa, autistic psychiatrist, diagnosed aged 5).

Conclusions:

Analysis of autistic psychiatrists’ perspectives on the nature of autism, mental health for autistic people and autism services highlights various avenues for research and to improve services and outcomes for autistic people in psychiatry whether as service user or service provider. However, the potential for such insights to benefit research and clinical practice as well as the autistic community more directly remains untapped because of barriers to disclosure. Self-recognition and disclosure by autistic psychiatrists may be facilitated by re-framing the traditional deficit-based view of autism towards a neurodiversity-affirmative approach.

426.402  (Poster) Client Insurance Status, Service Setting, and Autism Service Provider-Reported Use of Parent Coaching Strategies

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Background:

Parent coaching occurs when service providers use modeling and corrective feedback to teach parents to use intervention strategies (Kerns et al., 2019). For autistic youth, parent coaching is a cost-effective evidence-based practice (EBP) that improves social communication skills, reduces challenging behaviors, and lessens parental stress (Minjarez et al., 2020; Steinbrenner et al., 2020). Despite this potential, limited information exists regarding which factors influence the use of parent coaching within community-based settings where autistic
children receive care. This study examined contextual factors influencing provider-reported use of parent coaching with autistic youth and their families in community-based settings.

Objectives:

Determine the degree to which client insurance statuses, service settings, and their interactions predict provider-reported frequency of parent coaching use with autistic youth.

Methods:

Participants: 480 community-based behavioral, educational, medical, mental health, allied health, and other providers delivering services to autistic youth (7-22 years old) with social difficulties, externalizing behaviors, and/or anxiety.

Measure: A large-scale online survey was utilized to collect:

a) Client insurance statuses (i.e., school district, out of pocket/private pay, private insurance, public insurance, state-funded disability services, other)

b) Settings where providers deliver services (i.e., private practice, community mental health outpatient clinic, hospital/medical school outpatient clinic, specialized school for autistic children/other developmental disabilities (DD), specialized classroom for autistic children/other DD, outpatient clinic associated with a research center, other)

c) Provider-reported frequency of parent coaching (i.e., modeling intervention techniques, parent practice, and corrective feedback) use rated on a Likert scale, ranging from 1 (not at all) to 4 (very commonly)

Data Analytic Approach: Moderated multiple regression analyses determined the degree to which client insurance statuses, service settings, and their interactions predicted provider-reported frequency of parent coaching use with autistic youth. An a priori power analysis indicated a required sample size of N=469 to achieve 80% power for detecting a small effect, at a significance criterion of $\alpha=.05$. Client insurance statuses and service settings were each given a yes/no answer by providers (coded: 0=no, 1=yes) and provider-reported frequency of parent coaching use was averaged across indication of use for addressing anxiety, externalizing behaviors, and social skills.

Results:

On average, providers indicated occasional to common use of parent coaching. Main effects of client insurance statuses, service settings, and their interactions explained approximately 11.4% of variance in frequency of parent coaching use $[F(34,425)=2.12, MSe=.829, p<.001]$. Significant interactions were found between private insurance and private practice as well as school district insurance and private practice. Highest frequencies of parent coaching use were associated with delivering services in private practice and accepting private health insurance or school district insurance (Figure 1).

Conclusions:

While parent coaching is an EBP with proposed benefits of cost-effectiveness and outcome improvement, these findings highlight potential contextual factors influencing provider-reported use. Notably, private practice and accepting private insurance was associated with most frequent use. Given that most autistic children receive care in community settings, these findings reinforce the need for implementation strategies to ensure more frequent parent coaching use in broader settings when appropriate.
Objectives: The purpose of this study is to examine perceptions of EI providers on facilitators and barriers of providing culturally responsive EI to marginalized families.

Methods: We conducted a qualitative study using semi-structured individual interviews with 15 EI providers of varying professions across eight different states. Most of these EI providers reported working in the families’ homes, and the target children for the purpose of this interview either had a diagnosis of autism or suspected of being autistic. The interview questions were developed based on the Exploration, Preparation, Implementation, Sustainment (EPIS) implementation science framework, and the data were analyzed across different levels (i.e., individual, organization, and system). All interviews were conducted online in English.

Results: The interview data revealed several reported determinants (i.e., facilitators and barriers). These determinants were reported across the three levels, including individual, organization, and state. Facilitators on the individual level included: (a) providers’ own efforts to take on extra responsibilities, (b) using online translation tools, and (c) cultural self-efficacy. On the organization level, reported facilitators included (a) promoting interdisciplinary collaborations, (b) hiring culturally and linguistically diverse EI workforce, and (c) cultivating long-term relationships with interpreters. No system-level facilitators were reported. In terms of barriers on the individual level, providers reported (a) cultural clash between providers and families, (b) their own limited cultural awareness, and (c) independent contractors not having any organizational obligations, such as training. On the organization level, the barriers included (a) not providing relevant PD, (b) limited organizational infrastructure for training, (c) not enough interpreters or enough session time with interpreters, and (d) interpreters’ lack of content knowledge. On the system level, providers reported barriers of (a) no professional development (PD) on cultural diversity, and (b) not prioritizing working with marginalized families.

Conclusions: EI providers reported limited PD related to providing culturally responsive EI, and that they mostly rely on their own ability to seek out additional PD opportunities to learn about cultural diversity or the client’s culture and that they learn “on the job”. This indicates the needs for more accessible PD that targets increasing providers’ capacity to work with marginalized families. More implementation research needs to examine how providers are supported to provide more culturally responsive EI.

426.404 (Poster) The Use of Compass to Address EBP Disparities for Rural Children with Autism

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Background: The Collaborative Model for Competence and Success (COMPASS) is a comprehensive consultation and coaching intervention that has been shown in three randomized controlled trials (RCTs) to improve the social emotional learning (SEL) outcomes for students with autism regardless of age and autism severity. In rural areas, there is a trend of less availability and access to evidence-based practices (EBPs) for autism (Scarpa et al., 2020), and consultation interventions such as COMPASS can address this critical need for high-quality intervention. Barriers that individuals with autism and their families face in rural communities include increased distance from autism resources, lower socio-economic status, higher unemployment rates, lower parental education level, and less knowledge of autism (Antezana et al., 2017). These barriers interfere with access to high-quality early intervention (Noyes-Grosser et al., 2018). Families of children with autism who receive support report better family outcomes, including a greater understanding of their child, better advocacy skills, and knowledge of how to access services (Wicks et al., 2021).

Objectives: The purpose of this study was to test the hypothesis that there is no difference in student goal attainment outcomes in COMPASS for rural vs. non-rural students.

Methods: Data from two randomized controlled trials and a pre-post test of COMPASS delivered by school consultants were analyzed by geographic location to evaluate students’ IEP goal progress following COMPASS intervention (n = 56). Student ages ranged from 3 to 12 (M = 6.79), 82.7% of students were male and 17.3% were female; 36.9% of students attended rural schools and 63.1% of students attended non-rural schools. Individualized goals and intervention plans were collaboratively identified and developed for students using the COMPASS Profile completed independently by the caregiver and teacher about the students’ strengths and challenges in various domains (e.g., social communication skills, independent learning skills, sensory interests and challenges, etc.). Student outcomes were assessed using goal attainment scaling (GAS) using a five-point rating: -2 = present levels of performance, 0 = expected performance, +2 = much more progress than expected (AUTHOR, 2012). A paired samples t-test will be used to compare rural and non-rural student GAS outcomes.

Results: All students who received COMPASS demonstrated a significant increase in goal attainment across all three goal domains of social, communication, and learning skills, t(62) = 15.808, p = <.001, d = 1.09. As hypothesized, there were no significant differences in student GAS outcomes between rural and non-rural students, t(54) = -.500, p = .619, d = 1.09.

Conclusions: Students with autism and their families in rural communities face distinct barriers to accessing high-quality, evidence-based intervention. COMPASS offers a potential solution for bridging this gap through consultation and coaching support provided by trained school-based consultants to reduce the impact of disparities in evidence-based autism support for rural communities.
Background:
Caregiver-teacher alliance is an important building block to foster student success. Caregiver-teacher alliance can be defined as shared communication, investment, and concern for a child. Improved caregiver-teacher alliance leads to positive outcomes for children, specifically behavior and transition outcomes. Improved alliance additionally benefits caregivers by helping them feel more involved in educational decisions (Garbacz & McIntyre, 2015; Hampden-Thompson & Galindo, 2017; Thijs & Eilbracht, 2012).

Objectives:
We evaluated the association between caregiver and teacher ratings of alliance and child goal progress after receiving COMPASS when delivered by community-based COMPASS-trained consultants. Additionally, we sought to examine if increased caregiver or teacher-reported alliance related to caregiver and teacher ratings of goal progress.

Methods:
Participants included 28 triads consisting of a special education teacher, a student with autism from the teacher’s caseload, and the student’s caregiver(s). There were twelve total COMPASS consultants, all White females ranging in age from 24 to 60 years. Eighty percent of students were white, 6% Black, 3% Multiracial, and 10% did not report race. Almost half (46%) reported an annual income of less than 50K. Students ranged from 4-13 years old (84% male; 16% female), with a mean age of 7.39 (SD = 2.7). Most teachers were female (83.9%) and white (90.3%); the average number of years teaching was 11.14 (SD = 8.14). There were twelve total COMPASS consultants, all White females ranging in age from 24 to 60 years. COMPASS trainees had an average of 12.2 (SD - 7.03) years of consultation experience.

A within-subjects pre-post design was applied to study the impact of COMPASS on parent teacher alliance and child goal attainment outcomes. We examined change in teacher/caregiver alliance before and after completing COMPASS and child goal progress reported by the caregiver and teacher. Measures included the Parent-Teacher Alliance Questionnaire, a 20-item measure (1 ‘strongly disagree’ to 5 ‘strongly agree’) completed by caregiver and teacher. Caregivers and teachers reported goal progress using a single-item Likert scale (1 ‘none at all’ to 5 ‘a great deal’).

The impact of COMPASS on caregiver and teacher-reported alliance was examined using paired samples t-tests, one-tailed due to the directionality of our hypothesis. Pearson correlations were used to determine associations between caregiver and teacher-reported alliance and goal progress.

Results:
Both caregiver- \( t(22) =1.62, \ p=0.05; \ d = 0.425 \) and teacher- \( t(24)= 3.11, \ p< .01; \ d = 0.537 \) reported alliance increased following COMPASS intervention. Analysis of Pearson correlations between caregiver and teacher-reported alliance with teacher and caregiver-reported goal progress revealed a significant correlation between caregiver-reported alliance and caregiver ratings of goal outcomes \( r = 0.463; \ p = .026 \). However, the correlation between teacher-reported alliance and teacher ratings of goal outcomes was not significant \( r = 0.329, \ p = .906 \).

Conclusions:
COMPASS may enhance alliance between teachers and caregivers. Caregivers who report higher alliance with teachers also perceived better outcomes for their children. Although not originally intended to target caregiver-teacher relationships, COMPASS appears to have collateral effects in caregivers that may enhance child outcomes.
Challenges with emotion regulation (ER) are common and disruptive to the lives of autistic individuals and their families. Research on neurotypical children makes clear that parents play a critical role in children’s ER development, yet research examining parent-child emotional dynamics in families of autistic children is lacking. The present panel brings together four talks aimed at exploring how parents’ and autistic children’s behaviors and experiences around emotions relate to one another in childhood. The first presentation examines how child ER mediates the relationship between parent ER and child internalizing and externalizing problems. The second presentation reports on how various aspect of parenting (gentle guidance, scaffolding, involvement, and reinforcement) relate to children’s observed ER in both dyadic and independent regulation challenges. The third presentation explores the relationship between parent responses to child negative emotions and various child characteristics, including child ER. And finally, the fourth presentation reports on results of an intervention aimed at reducing parenting stress in parents of young autistic children, with downstream effects on child ER. Together, these four presentations demonstrate the importance of exploring parent-child dynamics around ER, with implications for identifying targets for interventions to meaningfully improve quality of life for autistic children and their families.

214.001 (Panel Discussion) Evaluating the Influence of Caregiver Emotion Regulation on Child Emotion Regulation and Behavioral Challenges in Autistic Toddlers

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Background: Caregivers play a critical role in the development of child emotion regulation (ER), which encapsulates one’s ability to modulate emotional reactions to environmental demands. Although challenges in ER in autistic youth are well documented (Beck et al., 2020), there are limited studies examining the influence of parent factors on child ER use. Similarly, child ER has been shown to contribute to behavioral problems and emerging findings suggest that child ER may mediate the relationship between caregiver ER and child behavioral problems in a community sample (Crespo et al., 2017); however, results have yet to be replicated in young autistic children.

Objectives:

1. Examine the direct association between caregiver and child ER in toddlers with ASD.
2. Explore the association between caregiver ER and children’s internalizing and externalizing symptoms as well as the mediating role of child ER.

Methods:

Participants included 64 toddlers with ASD (28.1% female, 25% Hispanic, M_age= 32.81 months) and their caregivers (85.9% mothers, M_age= 37.96 years). Parents completed self-report measures of ER strategies (cognitive reappraisal and expressive suppression from Emotion Regulation Questionnaire) and parent report measure of child ER (Flexibility Index from the BRIEF-Preschool Version) and challenging behaviors (Child Behavior Checklist). For aim 1, a regression predicting child ER was run with parent predictor variables (cognitive reappraisal and suppression) and covariates. Baseline correlations revealed no significant correlations between caregiver or child age, child non-verbal IQ and child ER; however, fathers reported significantly higher rates of expressive suppression coping (p<.01) and thus, caregiver gender was included as a covariate in the regression. For aim 2, the PROCESS Macro Model 4 (Hayes, 2013) was used to test whether caregiver ER strategies were indirectly related to child behavior problem outcomes via associations with children’s ER.

Results:

Less than 33% of participants were identified as having clinical levels of ER difficulties (n=12, 18.8%), externalizing (n=14, 21.9%) and internalizing challenges (n=11, 17.2%). After controlling for caregiver gender, caregiver cognitive reappraisal (β=-.29, p=.02) and suppression (β=-.39, p<.01) were significant predictors of child ER difficulties, such that less cognitive reappraisal and more suppression strategy use corresponded with higher child ER difficulties. For all mediation models run, no direct or indirect effects were significant such that caregiver ER strategy use did not correspond with child internalizing or externalizing difficulties and child ER did not play a mediating role.

Conclusions:

The current study provides preliminary evidence regarding the importance of caregiver ER strategy use in the context of ER development in young autistic youth. Because caregivers are often active participants and providers of treatment techniques, especially for preschoolers, future treatment models targeting child ER may benefit from measuring and providing support for adaptive caregiver ER. Interestingly our findings did not find support for a direct effect of caregiver ER on child internalizing or externalizing problems. Nonsignificant findings may indicate a delayed onset of such behaviors, small sample size, or limited heterogeneity in variables of interest.
214.002 (Panel Discussion) Differential Relations between Parenting and Emotion Regulation in Children with ASD across Dyadic and Independent Contexts

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Background: Children with ASD exhibit considerable difficulties with emotion regulation which, in turn, greatly impair functioning. Several intrinsic correlates of dysregulation have been identified in these children, including core symptom level and parasympathetic nervous system functioning (Baker et al., 2022). The search for potential environmental influences has been less fruitful, with parental co-regulatory scaffolding relating to children’s concurrent but not independent regulation (Fenning et al., 2018). Although some tentative cross-sectional evidence exists for emergent internalization of parental co-regulatory support as these children enter adolescence (Baker et al., 2019), the identification of additional and earlier support mechanisms is a critical precursor to effective psychosocial intervention.

Objectives: The current study examined several different aspects of positive parenting (involvement, reinforcement, gentle guidance, and scaffolding) as correlates of observed regulation in children with ASD, as measured in both parent-child and independent regulatory contexts. Methods: A sample of 77 children (79% male) with ASD aged 6 to 10 years participated in frustrating laboratory tasks with and without their primary caregivers, and the caregivers completed a parenting questionnaire. Children were diverse with regard to ethnicity (35% Caucasian, non-Hispanic), socioeconomic status, ASD symptom level and cognitive functioning (IQ range 47-121). Emotion regulation was coded from videotape and included dimensions outlined by Cole et al. (1994; dyadic ICC=.92; independent ICC=.91, see Baker et al., 2022). Parental scaffolding was coded during the dyadic task using a system validated with families of children with ASD that included motivational, emotional, and technical support (Baker et al., 2018; 2019; ICC=.73). Maternal gentle guidance was coded from an additional parent-child clean-up compliance task (Kochanska et al., 2001; ICC=.93), and both parental involvement (alpha=.81) and parental reinforcement (positive parenting scale=.72) were obtained through parent report on the Alabama Parenting Questionnaire.

Results: No child characteristics or demographic factors related to both the parenting and regulation variables. Differential relations were observed between parenting and children’s regulation when considered across contexts, with laboratory coded parent-child interaction (scaffolding and gentle guidance) correlated with children’s dyadic regulation (r=.23 and r=.24, respectively, p<.05), and parents’ reports of their overall involvement (e.g., transporting children, playing games together, attempts at communication, collaborating on plans) relating to children’s observed independent regulation, r=.32, p=0.01, over and above children’s age, IQ, and ASD symptom level, beta=.29, p=.02. Scaffolding and gentle guidance were not significantly correlated with each other. Conclusions: Findings suggest that intentional co-regulatory parenting behavior (e.g., scaffolding, gentle guidance for compliance) may relate to children’s regulatory behavior in the presence of the parent, but this potential influence does not appear to translate to children’s independent regulation by middle childhood. In contrast, children’s independent regulation appears correlated with parents’ report of their level of involvement with their children. Although direction of effects cannot be determined, these findings suggest the possibility that remaining broadly involved and engaged with children with ASD may promote their development of regulatory competence.

214.003 (Panel Discussion) Predictors of Parent Responses to Child Negative Emotions in Parents of Young Autistic Children

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Background: The preschool years mark a significant period in emotional development during which parents play a critical role (Eisenberg et al., 1998). How parents respond to their child in times of distress has an impact on emotional competence and emotion regulation development (Davidov & Grusec, 2006; Fabes et al., 2002). At the same time, children’s cognitive, verbal, emotional, and behavioral challenges likely impact how parent’s respond to them. Given vast heterogeneity amongst autistic children in intellectual and verbal ability, autism symptom severity, and emotion dysregulation, we aimed to understand how child characteristics relate to parent responses to child distress.

Objectives: Examine how child age, biological sex, parental education, intellectual disability, verbal ability, autism symptom severity, and emotion dysregulation predict parents’ a) supportive (i.e., encouraging and helping responses); b) unsupportive (i.e., discouraging and minimizing responses); and c) personal distress responses to their autistic child’s negative emotions.

Methods: Participants were 674 parents (94.4% mothers) of 2- to 5-year-olds (mean age = 4.6 years; 76% male) who participated in an online study. Parents provided demographic and descriptive information and completed several questionnaires, including: 1) the Coping with Children’s Negative Emotions Scale (CCNES), a self-report measure of parental response to child negative emotions; and 2) the Emotion Dysregulation Inventory-Young Child (EDI-YC), a parent report measure of child emotion dysregulation with two subscales: Reactivity and Dysphoria. These two measures and their subscales are described in detail in Table 1. In addition, parents filled out the Social Communication Questionnaire (SCQ), a measure of autism symptom severity, and reported on the child’s verbal ability (five categories ranging from fluent to nonverbal and presence of intellectual disability (ID)).

We ran three linear regressions predicting parents’ 1) Supportive Response Score; 2) Unsupportive Response Score; and 3) Distress Response Score. Predictor variables included age, sex, parent education, ID, verbal ability, SCQ scores, EDI-Reactivity Scores, and EDI-Dysphoria Scores.
**Results:** Results are presented in Table 2. Presence of ID predicted more supportive and less distressed responses. Higher SCQ scores predicted less unsupportive and less distressed responses. Higher emotional reactivity predicted more supportive responses, whereas higher levels of dysphoria predicted less supportive, more unsupportive, and more distressed responses.

**Conclusions:** Results suggest that, in general, parents of autistic children endorse less distress, more helping/encouraging, and less discouraging/minimizing in response to their children’s negative emotion when their child has higher support needs (e.g., presence of ID, higher autism symptom severity, and more emotional reactivity). However, autistic children’s level of dysphoria—characterized by low positive affect, anhedonia, and sadness—was predictive of less helping/encouraging, more discouraging/minimizing, and more distressed parental responses. Autistic children who struggle with the upregulation of positive emotion may not elicit as much positive support from parents, perhaps because their needs are not as clear as children with high reactivity (e.g., outbursts and tantrums).

**Methods:** Participants included 117 diverse parents of preschoolers with ASD (ages 3-5 years, 78.63% racial/ethnic minority) who were part of the NIH-funded Stress-reduction Techniques for Enhancing Parenting Skills (STEPS) Project. Parents were randomly assigned to receive Mindfulness-Based Stress Reduction (MBSR; n=59) or Psychoeducational Support (PE; n=58). Due to COVID-19, our final cohort (n=51; 44%) participated online. Parents reported on parenting stress and child emotion dysregulation at baseline, immediately post-intervention, and 6- and 12-months post-intervention. Parenting stress was indexed by the Parenting Stress Index-Fourth Edition, Short Form Parental Distress subscale (PSI-4-SF; Abidin, 1995). Parent-reported child emotion dysregulation was indexed by the Emotion Dysregulation Index-Young Child Reactivity score (EDI) and by the Emotion Regulation Checklist Lability/Negativity (ERC).

**Results:** There were no significant intervention-group differences in demographics, parenting stress, or child dysregulation at baseline. However, cohort (in-person/virtual) was included as a covariate due to associations with change in the EDI, with in-person groups reporting greater reduction in child reactivity than virtual groups ($\gamma_{10}=-2.37$, $p<.05$). Two-level linear growth curve models examined whether parent-reported child emotion dysregulation indices changed over time, whether change in child dysregulation differed by intervention group, and whether change in parenting stress over the course of intervention predicted change in child dysregulation.

Both indices of child dysregulation significantly decreased over time (EDI $\gamma_{10}=-2.63$, $p<.001$; ERC $\gamma_{10}=-2.76$, $p<.05$), but degree of change did not differ by intervention group. Change in parenting stress predicted change in child dysregulation (EDI $\gamma_{20}=2.9$, $p<.05$; ERC $\gamma_{20}=.21$, $p<.001$), indicating significant covariation. Notably, change in parenting stress accounted for change in parent-reported child lability/negativity (ERC), but change in child reactivity (EDI) remained significant even after controlling for the contributions of parenting stress.

**Conclusions:** Parents participating in stress-reduction interventions reported significant decreases in child dysregulation over time, with comparable effects for MBSR and PE. Evidence that reduced parenting stress predicted improvement in parent-reported child dysregulation suggests important mediational processes that may be tied to intervention-altered parent perceptions or behavior. Future analyses will incorporate additional measures of parenting behavior to examine proximal factors that may underlie change in child regulatory functioning in our diverse sample.
School is a place where children meet peers, socialize, and make friends, which contributes to their sense of belonging. However, many autistic children have difficulties attending school on a daily basis, and especially to participate in different kinds of social activities outside the classroom, such as their breaktime. In this session, we show how autistic children experience their school environment at different levels, via a multi-method, interdisciplinary approach including Psychology, Psychiatry, Computer Science, and Architecture. What factors contribute or hinder social participation? Taking into account individual (autistic) differences in needs and capacities, and addressing these in the social, cultural, and physical environment help to create a school climate that welcomes all children, in which diversity is valued and appreciated. The first presentation addresses the extent to which autistic pupils participate in school activities. Through a national survey, factors related to the pupils and school are discussed. The second and third presentations focus on autistic pupils’ social connections in school. Peer interactions on schoolyards are captured during recess via new wearable sensing technologies and combined with children’s self-reports. Lastly, we discuss strategies for enhancing social inclusion of autistic pupils in schools, by showing a systematic review on school-based interventions.

226.001 (Panel Discussion) School Participation of Autistic Youths: The Influence of School, Family, and Youth Factors


Background: School-aged youths have a basic human right to participate in educational and recreational activities inside the classroom and on the school grounds. Compared to non-autistic youths, autistic youths have much higher rates of school absenteeism (Adams, 2021). Also, when they attend school, they are less involved in educational and social activities (Kaljaca et al., 2019; Keen et al., 2021; Ratcliff et al., 2018). Traditionally, autistic youths have often been held accountable for the exclusion they experience (Edery et al., 2016; Keating & Louise, 2020). Recently, there has been a paradigm shift, showing an increasing emphasis on the role of environment in creating difficulties that autistic people experience (Dargue et al., 2021).

Objectives: The present study aimed to investigate autistic youths’ school participation and predictors of school participation on a school, family, and youth level, using data from a national survey conducted in the Netherlands. In addition to the often-considered individual factors of autistic youths such as age and level of autistic traits, we examined how the two important environmental settings (i.e., school and family) could affect autistic youths’ school participation.

Methods: In the Netherlands, children begin primary school from the age of 4 years and start the secondary education from the age of 12 years. The sample of this study included 200 autistic youths, aged between 4 and 16 years (Mage = 12.23 years, SDage = 2.93 years). Their parents filled in questionnaires online, reporting the age and autistic traits of their child, the extent to which their child participated in school activities, and the extent to which their child experienced barriers in the physical and social environment at school. In addition, parents reported their own educational levels and evaluated their perceived efficacy in supporting their child’s school life.

Results: Multiple linear regression analyses revealed that a higher level of autistic traits and greater barriers in the social and physical environment of school predicted a lower level of school participation of autistic youths. Among the predictors, barriers in the physical environment of school had the strongest negative association with autistic youths’ school participation. No associations were found between family factors (i.e., parents’ education levels and perceived self-efficacy) and autistic youths’ school participation.

Conclusions: This study provided new empirical evidence on the role of school environment in predicting autistic youths’ school participation. Noteworthy, our findings indicate that barriers in the school environment could have stronger impacts on autistic youths’ participation than youths’ personal factors or family factors. This highlights the importance of modifying the school environment, to make it more accommodating for autistic youths’ needs and to create a safe space where autistic youths can learn and participate.

226.002 (Panel Discussion) Social Connectedness in Autistic and Non-Autistic Pupils: Preliminary Findings


Background: In schools, autistic students often report to be less connected with their (non-autistic) peers, which indicates that they are more peripheral in classroom social networks. On the playgrounds, autistic students are also observed to have fewer social interactions with peers, participate in fewer joint activities, and spend more time on solitary activities instead. Despite these observations, autistic pupils do express a desire for social interactions and connections with others.
Objectives: This study aims to examine social connectedness reported by autistic and non-autistic pupils and their playground social connectedness during recess. The objectives of this study are twofold. First, the level of social connectedness in autistic and non-autistic pupils is examined and compared. Second, the relationship between self-report and playground social connectedness is examined, and the extent to which the two groups differ in this regard is explored.

Methods: Autistic pupils (N = 47, 5 girls and 42 boys) and their non-autistic classmates (N = 52, 29 girls and 23 boys) aged 8 to 14 years from two special schools in the Netherlands were recruited. Participants completed self-report questionnaires on social connectedness (i.e., peer acceptance and peer closeness centrality). Additionally, participants wore proximity sensors on the playground to measure playground social connectedness (i.e., total time spent in interactions, number of interacting partners, and playground closeness centrality). This modern sensing technology allows unobtrusively monitoring children’s face-to-face interaction during recess.

Results: Results showed no group differences in self-report or playground social connectedness. Higher levels of peer closeness centrality were related to more interacting partners during recess only in non-autistic pupils. No other significant correlations and group differences in correlational strength were noted.

Conclusions: The present study used self-report questionnaires and sensing technologies to examine social connectedness in autistic and non-autistic children. In this study, social connectedness appears comparable in the two groups. Yet, different from non-autistic pupils, autistic pupils’ social connectedness on the playground does not correspond with the self-report social connectedness. This highlights the importance to consider peer interaction during unstructured time when studying autistic pupils’ social relationship in school. Moreover, the study was conducted in special schools, where pupils with diverse special needs attend, and where more specialized personnel and knowledge are available to better guide and support them. Such individual differences are important to address when aiming for an inclusive school climate, also in special schools. Future study is suggested to further investigate social connectedness of autistic pupils in mainstream schools, and how to identify and translate strategies – that are developed in special schools – for implementation in mainstream schools.

226.003 (Panel Discussion) Social Connectedness and Loneliness in School for Autistic and Non-Autistic Children

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Background: Compared to non-autistic pupils, autistic pupils are often reported to be less socially connected in school: they make and receive fewer social initiations, are less often seen as “someone to hang out with”, engage in fewer reciprocal friendships, and more often spend time alone during recess (e.g., Chamberlain et al., 2007; Kasari et al., 2011). Moreover, recent studies show that when entering into adolescence, autistic pupils experience more loneliness in school than non-autistic pupils, which contradicts the traditional view that autistic pupils lack the desire to build social connections.

Objectives: While peer interaction is an essential part of most children’s school life, what remains underexplored is how autistic children feel about their social connections. Thus, this study aimed to understand the individual differences in how social connectedness is construed, both between and within groups of autistic and non-autistic pupils, using a multi-method approach including self-reports, peer reports, and wearable sensors.

Methods: Participants included 47 autistic children (5 girls, 42 boys) and 52 non-autistic classmates (29 girls, 23 boys) from two special education primary schools (Mage = 10.84 years, SD = 1.21). Regarding social connectedness in school, peer reports were used to measure (i) reciprocated friendships and (ii) centrality in their playmate networks; wearable proximity sensors (Radio Frequency Identification Devices, RFID) were worn by pupils on playgrounds during school recess to measure (iii) total time spent in face-to-face peer interactions, (iv) number of different interaction partners, and (v) centrality in playground social networks. To evaluate how they felt about their social connectedness, feelings of loneliness in school was measured by the self-reported Children’s Loneliness Scale (Maes et al., 2015).

Results: Compared to non-autistic pupils, autistic pupils had fewer reciprocated friendships (U = 1528.0, p (one-tail) = .001). Yet, the two research groups showed similar total time in interaction, number of interaction partners, playmate/playground centrality, and levels of loneliness in school. Higher levels of playmate centrality were related to lower levels of loneliness only in autistic children (rho = -.36, p (one-tail) = .002). Longer time in interaction during recess was related to lower levels of loneliness only in non-autistic children (rho = -.39, p (one-tail) < .001).

Conclusions: Autistic and non-autistic children may construe their loneliness in school differently, finding different features of social connections valuable. For these autistic children, feelings of loneliness may go beyond face-to-face interactions. Being accepted as part of a
peer group was key. Understanding relevant differences in the social needs of children could lead to more effective design for a welcoming school climate.

226.004 (Panel Discussion) School-Based Interventions for Increasing Autistic Pupils' Social Inclusion in Mainstream Schools: A Systematic Review


Background: School is an important environment for children to socialize with their peers and make friends, through which they also learn the social skills that prepare them for adulthood, such as how to negotiate and collaborate (Veiga et al., 2017). Moreover, peer interaction is crucial for children’s sense of belonging to their school (Allen et al., 2021), which also contributes to psychosocial wellbeing in later life (Palikara et al., 2021; Tian et al., 2016). Yet, many autistic children face challenges when joining an interaction with peers (Brewster & Coleyshaw, 2010; Kasari et al., 2011), are often excluded or ignored by non-autistic peers (Dean et al., 2014; De Boer & Pijl, 2016), and the physical environment could be too overstimulating for them to comfortably participate in social activities (Bailey & Baker, 2020). Special considerations are thus needed to make schools a more welcoming place for autistic children.

Objectives: In this study, articles on school-based interventions for enhancing autistic pupils’ social inclusion in primary and secondary mainstream schools were systematically reviewed. Included interventions had to target at least one level of the school environment: i.e., the autistic child, the peers, the staff, and/or the physical environment, and assessed autistic pupils’ quantity and/or quality of social participation as an outcome measure.

Methods: The PRISMA Checklist was used to guide the review process (Moher et al., 2009). A search was conducted in April 2021 using four electronic databases and via manual search of reference lists of the retrieved studies. The studies included had to involve autistic participants in primary or secondary mainstream schools, a school-based intervention implemented at one of the four levels of the school environment for improving social inclusion of autistic pupils, a group design or a single-subject design that allows for testing the effect of the intervention, and a “strong” or “adequate” methodological quality rating (Reichow et al., 2008). The screening and eligibility check were conducted by two individual coders.

Results: A total of 56 studies met the inclusion criteria. Findings of these studies showed that interventions at child-level improved accessibility of school and social activities for autistic pupils, whereas interventions at peer-level enhanced their integration. Interventions in the physical environment improved autistic pupils’ responses to peers, but it was uncertain if this was reciprocal.

Conclusions: A holistic strategy interconnecting different levels of the school environment, moving focus from individual children’s capacities to modifying the larger context, seems to enhance better social inclusion of autistic children in regular schools.

ORAL SESSION — SOCIAL COGNITION AND SOCIAL BEHAVIOR

312 - Eye Gaze & Eye Tracking

Moderator: Matthew Goodwin, Northeastern University, Boston, MA

312.001 (Oral) Characterising Eye Tracking Social Functioning Subgroups with EEG, Structural and Functional MRI

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Background: Eye tracking indices of social attention, such a looking time to faces, often differ in autistic people relative to neurotypical controls. There is, however, much overlap in distributions of these measures, and little consensus on the cognitive, social and neurobiological mechanisms that underly them.

Objectives: 1) To stratify participants by eye tracking indices of social attention, and 2) To use EEG, fMRI and genetic data to characterise these subgroups.
Methods: We collected eye tracking data from autistic (N=393) and neurotypical (N=270) participants aged 6-30 years whilst they watched a naturalistic social video and aggregated proportion of attention to the faces within 250ms bins across the time course of the video. We then performed a PCA across these time courses, and selected all components explaining > 1% variance. We ran a Gaussian mixture model clustering approach on the loadings and selected the optimal number of clusters based on BIC score. We then characterised these clusters by 1) clinical variables (ADOS, ADI); 2) P1 and N170 ERP amplitude and latency to upright faces; 3) MRI cortical thickness and surface area; 4) fMRI activation to faces.

Results: The PCA decomposition revealed 23 components that each explained more than 1% of variance (total: 73% cumulative variance). GMM clustering revealed an optimum number of clusters of four (BIC = 12380.2), revealing a cluster of participants with low face looking throughout (Low Face); a cluster with initially moderate face looking that declined over time (Declining Moderate Face); a cluster with initially high face looking that again declined over time (Declining High Face); and a cluster with sustained high face looking (High Face). Clusters differed on:

1. **Clinical variables:** High Face lookers had a lower proportion of autistic people than other groups and within the ASD group showed higher IQ, fewer symptoms, and stronger adaptive skills. In contrast, Low Face lookers showed the most pronounced symptoms, the lowest IQ and the poorest adaptive function. Variation between clusters was stronger for the ADI than the ADOS.
2. **EEG P1 and N170:** Both the parietal (P7/8) P1 and N170 differed by cluster membership in the autistic group (P1: F(3, 472)=3.62, p=0.013; N170: F(3, 472)=3.64, p=0.013, but not in the NT group (F’s<2.36, p’s>.072).
3. **Structural MRI:** Cluster membership had a significant effect on surface area including a) right superior parietal cortex, precuneus cortex, inferior parietal cortex, and isthmus cingulate cortex; b) right lingual gyrus and isthmus-cingulate cortex; and c) left postcentral gyrus, superior parietal cortex, and supramarginal gyrus (all p’s<.001).
4. **fMRI:** Face looking associated with amygdala habituation to faces (R=-0.107, p<.001).

Conclusions: We demonstrate data-driven subgroups stratified by the dynamics of social attention, and describe neurobiological differences in these subgroups in terms of brain structure, function and electrophysiology. Together, these data suggest that low-cost, non-invasive eye tracking technology can be used to acquire clinically, genetically and biologically meaningful markers of social function in autism.
Conclusions: These findings expand upon existing research by suggesting that autistic people—beyond solitary social simulations—demonstrate significantly less socially directed gaze and achieve less mutual eye contact during dyadic, naturalistic conversations than their neurotypical peers. This work is also novel in terms of its direct, granular sampling of behavior and focus on both members of a social dyad. Future directions for this research include using these manual annotations to inform the development of computational tools for automatic quantification of social gaze patterns during conversations.

312.003 (Oral) Differing Predictive Strategies in Toddlers with and without Autism Underlie Rhythm of Social Engagement

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Background:

Rhythm is an important mechanism for scaffolding social behavior. Impairments in rhythm, including in social timing/coordination, in autism are increasingly examined in light of models of predictive coding (Sinha et al., 2014). We previously demonstrated that during child-directed singing, typically developing (TD) and autistic toddlers use predictable rhythms to modulate their eye gaze, increasing attention to a singer’s eyes on metrically strong beats (Chawla et al., 2021). Here we extend this work to assess predictive processes underlying time-locked attention to the eyes when engaged by child-directed singing of varying predictability.

Objectives:

Investigate how different models of temporal prediction hypothesized to be linked to autism manifest in the timing of eye-looking to unpredictable child-directed singing.

Methods:

Eye movements of toddlers 18-36 months old (ASD: n=31; TD: n=39) were tracked while watching videos of child-directed singing. Songs were presented in original, temporally predictable versions and experimentally-manipulated versions in which rhythms were jittered to disrupt predictability. We used peristimulus time histograms (PSTHs) and peak phase (where a phase of 0 is perfect alignment) to assess rhythmically entrained eye gaze to actual beat timing and for beat times predicted by two models of temporal prediction corresponding to two prevailing hypotheses of prediction impairments in autism: a linear regression of all previous beat times, representing the slow-updating theory; and the average of all previous beat inter-onset intervals, representing the high-precision hypothesis (Figure 1). We measured time-locking of eye-looking using permutation testing of peristimulus time histograms (PSTHs) and assessed the angular concentration of phase terms using the Rayleigh test of uniformity (i.e., metric of response consistency).

Results:

During original, unjittered (temporally predictable) singing, TD and autistic toddlers exhibited increased eye-looking time-locked to the beats (Figure 2a,e), though phase of eye-looking was more uniform in TD (R=0.55, p<0.001) than autism (R=0.31, p=0.06). During the jittered, disrupted predictability singing, magnitude of time-locked eye-looking to actual beat times was substantially reduced in both groups (Figure 2b,f) though continued to exhibit significant phase uniformity in TD (R=0.49, p<0.001) but not autistic (R=0.24, p=0.19) toddlers. Notably, when comparing time-locked eye-looking to beat times predicted by the two models in the jittered condition, TD toddlers showed no preference between the models (Figure 2c,d) while autistic toddlers showed significantly stronger phase synchronization of eye-looking in the regression (slow-updating) model (R=0.52, p<0.001) (Figure 2) but no use of the average IOI (high precision) model (Figure 2g,h). In autism, the regression model better predicted eye-looking timing than actual beat times.

Conclusions:

Rhythmic predictability may serve as a structuring mechanism to help children coordinate their behavior to important moments of social-communicative signaling. When presented with unpredictable social stimuli, TD and autistic toddlers use different approaches to time their eye-looking. While TD toddlers appear to show flexibility in use of predictive strategies, enabling them to accommodate unpredictable cueing, autistic toddlers consistently use a slow-updating model that makes then less able to adapt to cues in the actual stimulus. Results have implications for use of rhythmic predictability during natural interactions to scaffold social behavior.

312.004 (Oral) Deconstructing Slower Latency to Faces during Visual Exploration in School-Age Children with ASD: Results from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT)

Background:

Prior work has identified slower latency of first look-towards-faces (LTF) in autistic children compared to controls on an eye-tracking (ET) visual exploration task (1). However, it is unclear whether this is due to increased perseveration on non-social objects prior to first look-towards-faces or decreased attentional prioritization towards faces. Furthermore, it is unclear whether visual exploration strategies associate with clinical and neural profiles.

Objectives:

To test, via between-group modeling, whether increased non-social perseveration or decreased social stimuli prioritization better accounts for slower latency of first look-towards-faces; and to investigate relationships between visual exploration variables and 1) clinical characterization, and 2) EEG signal features related to face processing.

Methods:

Participants included 399 6-11-year-old children (ASD: n=280, male=215; TD: n=119, male=83) from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT) Main Study Timepoint 1. Stimuli comprised static arrays of five objects including one face. Non-social perseveration and decreased social stimuli prioritization were tested, respectively, by linear model testing of group differences on two variables: 1) Average time spent looking at each object prior to first look-to-face (Time per Object Prior - TpOP); and 2) How many objects were looked at (including repeats and central fixation) before the child first looked at the face (Look Number Face - LNF).

Associations in the ASD group between clinical variables (ADOS 2 Social Affect, Vineland-3 Socialization & Communication, NEPSY-II Memory for Faces), EEG variables (right posterior temporal P100 amplitude and N170 latency in response to static images of faces (2,3)), and LTF, TpOP, and LNF were assessed using non-parametric Spearman’s rank correlation coefficients partialing for age, IQ, and data quality (4).

Results:

Group differences were observed on LNF (F=16.40, p<.0001), but not TpOP (F=0.013, p=.91). Children with ASD looked at more objects before the face (2.95, 95%CI [2.87, 3.04]) compared to TD children (2.66, [2.55, 2.77]) (t(385)=4.05, p=.0001). Both LTF and LNF were negatively correlated with Vineland-3 Socialization Scaled Score (p<.05, Figure 1). LNF was negatively correlated with NEPSY-II Memory for Faces (p<0.01, Figure 1). A negative correlation was observed between right posterior temporal P100 amplitude and both LTF and LNF (Figure 2) with increased P100 amplitude associated with earlier looks to faces and fewer looks to nonsocial objects before first look-to-face.

Conclusions:

Results support the decreased attentional prioritization towards faces hypothesis in the ASD group, but not the non-social perseveration hypothesis. Negative correlations between LTF/LNF and social communication variables align with prior findings (5) and suggest attentional prioritization for faces may index clinically meaningful variation. Negative correlations between right-side posterior temporal P100 amplitude, which may represent level of neural activation/use of neural resources in attention to meaningful stimuli (6), and LTF/LNF suggests coupled variance between neural mechanisms and attentional strategies that may underlie and reflect differences in social motivation and response to social rewards in children with ASD.

1. Xie et al.2021.INSAR.
### 313 - Cross-Neurotype Communication & Interaction

**Moderator: Sander Begeer, Clinical Developmental Psychology, Amsterdam, Netherlands**

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<td><strong>313.001</strong> (Oral) Deception Cues in (dis)Honest Autistic Mock-Police Suspects</td>
<td>R. Bagnall, A. Russell, M. Brosnan, and K. L. Maras</td>
<td>(1)Psychology, Centre for Applied Autism Research, University of Bath, Bath, United Kingdom, (2)Psychology/Centre for Applied Autism Research, University of Bath, Bath, UNITED KINGDOM, (3)Centre for Applied Autism Research, University of Bath, Bath, United Kingdom, (4)university of bath, bath, United Kingdom</td>
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**Background:**

Investigative interviews are likely to present significant challenges to those on the autism spectrum. Social and cognitive differences associated with autism as well as a lack of autism-specific suspect interview methods suggest unique vulnerabilities for autistic suspects at interview. Relatively, behavioural and communication differences mean that autistic people may also be more likely to be perceived as deceptive. These two issues have substantial implications for the efficacy and fairness of police suspect interviews with autistic adults.

**Objectives:**

We aimed to investigate how verbal, paraverbal and nonverbal cues associated with deception are presented by autistic adults during mock-police interviews. In Study 1, we aimed to establish if (and how) autistic adults’ truthful and deceptive accounts differ from those of non-autistic controls. We predicted that autistic adults’ deceptive accounts would present more pronounced verbal cues to deception (i.e., greater inconsistencies, sparser accounts) than those of non-autistic adults. We also expected that autistic adults’ truthful accounts would more frequently display verbal deception cues than neurotypical adults’ truthful accounts. We also anticipated that autistic suspects would experience the investigative interview as more challenging than non-autistic suspects. In Study 2, we aimed to identify which verbal, paraverbal and nonverbal behavioural cues are most commonly reported by observers who (incorrectly) perceive truthful autistic mock-suspects as deceptive.

**Methods:**

In Study 1, 32 autistic and 33 (age and IQ-matched) non-autistic adults either undertook a simulated ‘criminal’ or ‘non-criminal’ task in a novel virtual environment. Participants were then instructed that they were to be interviewed as a lead ‘suspect’ in the mock-offence. ‘Criminal’ participants were instructed to lie and ‘non-criminal’ participants were instructed to tell the truth. All interviews were video recorded and transcribed to produce quantitative verbal cues. In Study 2, 70 lay rater participants (unaware of autism diagnosis) viewed a video of an autistic mock-suspect from Study 1 (providing a truthful account) and judged whether they were lying or telling the truth.

**Results:**

In Study 1, innocent autistic mock-suspects reported fewer details that would support their innocence ($t(30) = -2.075, p = .023, d = -.735$), although both autistic and non-autistic mock-suspects reported similar levels of investigation-relevant information and statement-evidence consistency (all $ps > .079$). In post-interview questionnaires, autistic mock-suspects self-reported greater difficulty understanding interview questions, higher anxiety, and perceived the interview as less supportive than non-autistic participants (all $ps < .040$). In Study 2, lay raters who judged the mock-suspect as deceptive based this evaluation upon verbal, paraverbal and nonverbal cues associated with deception, many of which are autism-common behaviours and relevant to the difficulties experienced by autistic participants during the mock-suspect interviews.

**Conclusions:**

Our findings show that investigative interviews are more socially and cognitively demanding for autistic mock-suspects than non-autistic controls. As such, a range of verbal, paraverbal and nonverbal cues associated with deception are displayed by autistic mock-suspects even when truthful. The development of autism-focused suspect interview techniques is therefore crucial to resolve the (interrelated) issues of interviewee welfare and provision of best evidence.

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<td><strong>313.002</strong> (Oral) Investigating Neural Mechanisms Associated with the Double Empathy Problem Using fNIRS Hyperscanning</td>
<td>K. Turner, R. A. Stevenson, and B. Stojanoski</td>
<td>(1)Western University of Ontario, London, ON, Canada, (2)University of Western Ontario, London, ON, Canada, (3)Western University, London, ON, Canada</td>
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Background: One common aspect of Autism is difficulty with social interactions. The Double Empathy Problem Hypothesis (DEPH) argues that autistic-related social difficulties may be due to differences in communication styles between autistic and neurotypical individuals that diverge throughout development. This hypothesis is supported by findings that interactions between two autistic individuals are deemed more comfortable than those between autistic-neurotypical dyads. Are differences in social communication styles between autistic and non-autistic persons related to the degree of shared neural processes during interactions?

Objectives: We used an fNIRS hyperscanning paradigm to examine whether the degree of neural synchrony between interacting pairs with varying levels of autistic traits is associated with the Double Empathy Problem.

Methods: Participants (N=14, data collection ongoing) were classified as having high (H) or low (L) levels of autistic traits, based on Autism-spectrum Quotient scores. These classifications were then used to create H-H, H-L, and L-L pairs. Brain activity was then recorded simultaneously from both participants with fNIRS using a 45-channel montage during social interactions. Activity was recorded from the temporo-parietal junction (TPJ) and prefrontal cortex (PFC). Functional connectivity measures were used to examine synchrony patterns within groups for each of four social interaction conditions.

Results: Synchrony patterns differed based on dyad, story, and communication type. For instance, we found fewer synchronous connections in both TPJ and PFC for the non-ToM story in L-L dyads (p<.05); more TPJ connections during the non-ToM story and more PFC connections during the ToM story in the L-H group (p<.05); and many connections in TPJ (lateralized to the right hemisphere) and PFC for both ToM and non-ToM stories in the H-H group (p<.05; Figure 1). We also found synchronous connections of greater significance during non-ToM discussion for the L-L group (p<.05); right lateralized TPJ synchrony during non-ToM story discussion, and left lateralized TPJ synchrony during ToM story discussion for the L-H group (p<.05). Conversely, synchrony was lateralized to the left TPJ during non-ToM discussion and the right TPJ for ToM discussion for the H-H group (p<.05; Figure 2). All p-values were FDR corrected.

Conclusions: We used fNIRS hyperscanning to assess real-world interactions across dyads with varying degrees of autistic traits, to test the DEPH. While all groups had significant inter-brain synchrony in PFC and TPJ, patterns of synchrony differed based autistic traits, and the presence of ToM elements during story listening and conversation. Pairs with low autistic traits appear most synchronized in general, and dyads with high autistic traits appear to have more synchrony than pairs differing in autistic trait expression in PFC. Our results suggest that matched dyads have more shared neural processing likely contributing to quality of interaction, supporting the DEPH.

313.003 (Oral) Loneliness in Daily-Life in Neurodevelopmental Disorders

Background: Being alone (*i.e.* aloneness) can lead to loneliness, a negative emotional experience, but can also be enjoyed. It is not yet clear whether individuals with autism spectrum disorders (ASD) like being alone or feel lonely. However, this is a crucial distinction that needs to be understood, as social interaction difficulties are at the heart of the autism phenotype. Recently, we began to address this question by studying social interactions with the Ecological Momentary Assessment (EMA), an ecological methodology that enables repeated assessments in the flow of daily-life. The main results showed an intact social motivation but more isolation and rejection feeling in a non-social context compared to typically developing individuals (TD) and to individuals with 22q11.2 deletion syndrome (22q11DS), a genetic syndrome that has frequently been described as mimicking the social difficulties of ASD. Therefore, loneliness appears to be an aspect of the social phenotype in ASD that requires further investigation. In addition, loneliness has been described as a predictor of mental health is therefore a critical topic to study.

Objectives: This study aims to better characterize loneliness in individuals with neurodevelopmental disorders using a combination of ecological (EMA) and classical (questionnaires) measures, as well as its association with emotional reactivity and mental health.

Methods: One hundred and sixty-seven participants (79 females, 88 males) aged 12-30 years old were included in the study: 48 individuals with ASD, 54 22q11DS carriers and 65 TD. All participants were assessed with EMA during 6 days 8 times a day using the RealLife smartphone app. The items assessed positive and negative affects, loneliness and the subjective experience of aloneness. Reactivity to loneliness was measured as an increased in negative affects and a decrease in positive affects in response to loneliness. Paper-pencil questionnaires were used to assess positive and negative attitude toward aloneness (“trait” loneliness) as well as symptoms of mental health difficulties.
Results: There was no difference between the groups in terms of loneliness, and all participants reported feeling more lonely when alone than in the company of others. However, at the within-person level, the variance of loneliness was significantly different between groups, with higher variance in participants with ASD than among 22q11DS carriers and TD, as well as among participants with 22q11DS compared to TD. On emotional reactivity in response to loneliness, there was a stronger negative reactivity in participants with ASD compared to 22q11DS, as well as a stronger positive reactivity in ASD and TD participants compared to 22q11DS. On “trait” loneliness, participants with 22q11DS and ASD expressed greater affinity toward being alone than TD, and participants with ASD expressed lower aversion toward being alone than TD. However, loneliness in daily-life was not associated with trait loneliness in any group. Finally, no association between loneliness and mental health was observed.

Conclusions: This study opens up new avenues on the topic of loneliness, both state and trait, as well as its relationship with emotional reactivity and mental health in neurodevelopmental disorders and may have an impact on the care of these individuals.

313.004 (Oral) Non-Autistic Observers Both Detect and Demonstrate the Double Empathy Problem When Evaluating Interactions between Autistic and Non-Autistic Adults

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Background: Autistic adults often experience more successful and enjoyable interactions with autistic compared to non-autistic (NA) partners (Crompton et al., 2020; Morrison et al., 2020). This is consistent with a “double empathy” framework (Milton, 2012), which suggests that social interaction difficulties in autism are not inherent deficits but instead occur selectively with NA partners.

Objectives: This study examines how NA observers evaluate interactions between two autistic people relative to interactions between two NA people and mixed (A-NA) interactions.

Methods: One hundred and two NA adult observers viewed recordings of 42 autistic and 44 NA male participants interacting in one of three dyadic conditions: mixed (one autistic, one NA), both NA, or both autistic, and provided evaluations of character traits and interaction outcomes. Observers were not made aware of the composition of dyads. Multilevel modeling with REML was used to compare the effects of diagnosis and dyad composition on ratings both across and within dyads.

To determine whether observers could accurately predict participants’ assessments of their interactions, observers also estimated how each dyad member would evaluate the interaction and their partner. These ratings were compared to dyad members’ actual ratings using the Truth and Bias model, which assesses both the similarity between ratings (i.e. accuracy), and the directional bias (i.e. degree of over- or under-estimation).

Results: Overall, NA-NA interactions and participants were rated most positively. Observers perceived mixed interactions between autistic and NA adults as the least successful overall, with NA-NA dyads rated more positively than A-NA dyads on enjoyment (p < .001), smoothness (p < .001), awkwardness (p = .017), and intimacy (p = .043), and more positively than A-A dyads on enjoyment (p < .001) and smoothness (p = .004). However, observer ratings of NA-NA dyads did not differ significantly from ratings of A-A dyads on awkwardness (p = .254) or perceived intimacy (p = .979) between conversational partners. Observers also detected significantly more disclosure from autistic participants when interacting with an autistic relative to an NA partner (p = .008), and NA participants when interacting with an NA relative to an autistic partner (p < .001). NA observers rated autistic participants significantly worse than how their partners rated them within the interaction, and underestimated ratings to a greater degree than for NA participants on attractiveness, trustworthiness, likeability, and intelligence (p = .001). Observers also underestimated autistic participants’ social interest in their partners to a greater degree than for NA participants (p = .01).

Conclusions: Collectively, these findings indicate that NA adults both detect and demonstrate aspects of the double empathy problem during their observations of social interactions involving autistic people. They noticed that mixed interactions were less successful than those between two autistic or two NA partners, yet they also were less accurate at estimating how autistic participants felt about their partners relative to NA participants, suggesting that NA observers are poor at deciphering autistic signals of social interest. If extrapolated to real-world environments, this finding could translate into misperceiving autistic peoples’ desire for social inclusion and interaction.

POSTER SESSION — SOCIAL COGNITION AND SOCIAL BEHAVIOR

418 - Social Cognition and Social Behavior I

418.341 (Poster) Lying to the like-Minded: Is It Easier to Spot Deception in Someone of the Same Neurotype?

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Background: The double empathy problem (DEP) in autism suggests that the socio-communicative difficulties faced by autistic people are not just because of atypical cognition in autism, but due to a breakdown in reciprocity and mutual understanding between autistic and non-autistic people. This is evidenced by the comparable success of autistic-only and non-autistic-only communication chains, but not mixed chains. Autistic participants are also more successful at attributing mental states to animated triangles created by other autistic people than they are for animations by non-autistic people, while the opposite is true for non-autistic participants.

Objectives: The current study investigated if the DEP extended to non-verbal deception, as autistic individuals find deception detection difficult but have only ever been tested on deception detection from non-autistic agents.

Methods: 103 autistic and 104 non-autistic adults of comparable age and ability watched 3-second non-verbal videos of both autistic and non-autistic agents lifting boxes, sometimes faking the weight of the box. Participants judged how fake the lift was on a scale of 1 (real) to 5 (pretend). Participants were aware that there were both autistic and non-autistic agents in the videos, but the neurotype of individual agents was not disclosed. It was hypothesised that participants would be better at distinguishing between pretend and real lifts for neurotype-congruent agents, i.e. autistic participants would detect deceit better from autistic agents, and non-autistic participants would detect deceit better from non-autistic agents.

Results: Both autistic (Figure 1a) and non-autistic participants (Figure 1b) were able to distinguish between real and pretend lifts, although autistic participants did so to a lesser extent. Both groups were better at distinguishing between real and pretend lifts from autistic agents than non-autistic agents. In comparison to non-autistic agents, autistic agents were judged to be more deceptive for pretend lifts by all participants, whereas for real lifts, autistic agents were judged to be more deceptive only by non-autistic participants, but not by autistic participants.

Conclusions: In line with past findings, autistic individuals in this study showed weaker deception detection ability. Both groups were better at detecting deception from autistic agents, which does not support the DEP; this could be because autistic agents reveal more deception cues. Additionally, findings here are consistent with past literature that suggest autistic individuals are perceived less favourably—notably, here autistic agents were considered to be deceptive by non-autistic participants even when they were being genuine. As these judgements were made on the basis of short, non-verbal videos with no indication of the agents’ neurotype, this must be due to some fundamentally different characteristic of autistic individuals, such as the way they move, that paints them in a negative light. This has far-reaching consequences for how autistic individuals are perceived in their day-to-day lives: such as in interpersonal relationships; or more worryingly, in high-stakes situations such as criminal investigations.

418.342 (Poster) A Novel End-to-End Dual-Camera System for Eye Gaze Synchrony Assessment during Face-to-Face Interaction

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Background: Quantification of face-to-face interaction has the potential to inform much about interpersonal communication. Current commercial, glint-dependent solutions suffer from several disadvantages and limitations when applied to examine face-to-face interaction. These include data loss, the inconvenience of using wearables, and/or the need for several cameras to capture each person. Here we present a novel eye-tracking solution, consisting of a dual-camera system used in conjunction with an individually optimized deep-learning approach that aims to overcome at least some of these limitations (setup displayed in Figure 1).

Objectives: To investigate if a dual-camera system used in conjunction with deep learning-based eye-tracking can be used to accurately classify gaze at specific facial areas and capture subtle differences in gaze synchrony in face-to-face interaction.

Methods: The present proof-of-concept study consisted of two experiments using a convenience sample of 8 healthy individuals (4 females; between 23 – 44 years) and the experimenter (male; 26 years). In Exp. 1, we examined the accuracy of the deep learning-based eye-tracking methodology using a 9-point calibration similar to those currently used in monitor-based eye trackers. In Exp. 2 the experimenter and a participant sat across from each other and each listened to a pre-recorded verbal instruction (60 5-second trials) directing them to look either at the left eye, right eye, mouth or just outside their partner’s face.

Results: The data show that our system, using deep learning methodology, can accurately classify the gaze location within different areas of the face of two interlocutors and capture subtle differences in interpersonal gaze synchrony between two individuals in a close-to-natural face-to-face interaction. The median rate of correct gaze classification was 89.54% across participants and conditions. Four separate Friedman tests confirmed that there were significant differences in the median prediction rate in each of the conditions Q (df = 3, n = 8) ≤ 14.55, p ≤ .002 (Figure 2).
Background: Compared to the general population autistic individuals report disproportionate rates of mental illness and suicidality. Evidence suggests that autistic core social deficits result in atypical social behaviours that inhibit social connection. This subsequently leads to fewer social connections, which are known to decrease loneliness and depression. Differences in autistic social behaviour are often perceived by others to portray a lack of desire for social relationships. This has led to the development of Social Motivation theory (SMt), which proposes that autistic individuals find socialisation less motivating due to a deficient social reward system. Consequently, autistic individuals have fewer social interactions, which reduces opportunities to learn and develop competent social communication skills. However, many autistic individuals camouflage to enhance social competency in the pursuit of socially desired outcomes. Camouflaging is highly reliant on observing others’ social behaviour and practicing these skills through social interactions. Yet, camouflaging can be inefficient and unsuccessful, which subsequently often negatively impacts mental health and wellbeing. Thus, SMt requires closer examination, particularly with attention to camouflaging.

Objectives: To synthesise empirical evidence of camouflaging autistic symptoms to obtain desired social relationships in autistic adolescents and adults.

Methods: Systematic searching of three databases yielded 1281 records. After duplicate deletion, 1029 records were screened for inclusion. Exclusions left 70 full texts of which nine qualitative studies met inclusion criteria and were retained.

Results: Camouflaging was a major theme in the socialisation experience for autistic adolescents and adults. The desire for social connection and acceptance was prevalent, and camouflaging was the main strategy used to pursue these outcomes, although not the most preferred strategy. For most, camouflaging was exhausting, isolating, often ineffective, and a challenge to one’s social authenticity, which negatively impacted their mental health.

Conclusions: Camouflaging is an extremely taxing, yet highly prevalent strategy used by autistic adolescents and adults to obtain social connection. Its use exemplifies the importance of social connection to autistic individuals. We need to understand more about individual differences in social motivation in autism, the strategies used to obtain social connection, and how to support them to achieve this endeavour.

Background: Recent studies have reported abnormal processing of happy expressions in children with ASD. For example, Kim et al. (2015) found reduced tendency to approach to positive social-emotional events in children with ASD. Further, Sepeta et al. (2012) suggested reduced sensitivity to positive and rewarding stimuli in children with ASD. Despite recent findings on abnormal social reward processing in ASD, to our knowledge, deficits in emotion recognition processing for positive expressions have not been reported in ASD. As happy emotion is considered to have social rewarding values, here we examined processing of happy emotional expressions in children with ASD using dynamic facial stimuli.

Objectives: The purpose of this study is to discover emotion recognition functions in children with ASD. We expected to find less sensitive processing to detect happy expressions in children with ASD possibly due to their abnormal reward sensitivity.

Methods: Eleven children with ASD (aged 6-12) and 12 age and gender matched typically developing controls (TD) performed a dynamic facial emotion recognition (DFER) task. The DFER task consisted of 72 video clips of faces. Each face gradually changed its emotion from neutral to full expression of one of six basic emotions (happiness, sadness, fear, disgust, anger, or surprise). Participants were asked to watch the video clip and make their choice among the six emotion labels as soon as they noticed emotion. The children were asked to respond twice: the first choice was made within 10 second of the video clip, and the second choice was made after the video clip stopped. The sensitivity of emotion recognition was defined as reaction times of the correct response of the first choice. The accuracy of emotion recognition was defined as accurate response rates of the second choice.

Conclusions: Our data show that this novel dual-camera system can accurately classify gaze location within different areas of the face of two interlocutors, effectively addressing some of the limitations of the current commercial solutions. In addition, the proposed approach allows to quantify subtle differences in interpersonal gaze synchrony between two individuals during a natural face-to-face interaction.
Results: Data from fear expression were excluded for further analyses since the accuracies were below the chance level for both groups. For the accuracy data, 2 (group) * 5 (emotion) repeated measures of ANOVA was conducted to examine emotion recognition dysfunctions in ASD. Results revealed a significant interaction effect between emotion and group ($F(1, 20)=4.94, p<.05$), after controlling for effects of full-scale IQ. Post-hoc analyses confirmed that children with ASD showed significantly lower performance to detect disgust emotion compared to TD ($t(15.42)=-2.56, p<.05$). The same series of analyses were conducted for the sensitivity data. Results showed a significant interaction between emotion and group ($F(1, 20)=8.62, p<.05$), revealing lower sensitivity to detect happiness in the ASD compared to the TD group ($t(21)=2.74, p<.05$).

Conclusions: Overall, we demonstrate differentiated facial emotion recognition processing in children with ASD depending on the valence of the expression. Specifically, children with ASD showed impaired processing to accurately detect negative emotion (i.e., disgust) in line with previous findings on ASD. Here, we also report a novel finding that children with ASD are less sensitive to detect the happiness expression. The lower sensitivity to detect happiness in ASD may be related to the abnormal reward processing and reward sensitivity of children with ASD, which can contribute to their abnormal social cognitive functions.

418.345 (Poster) Academic Interactions between Autistic University Students and Their Instructors: What Can We Learn from Autistic and Neurodivergent Instructors?

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Background: Autistic students are increasingly enrolling at universities worldwide. However, most university instructors are non-autistic and may be unaware of autistic students' lived experiences of learning and socializing. Research concerning the academic interactions (verbal and written) between autistic university students and their instructors is limited. Using Milton's (2012) Double Empathy Problem and selected rhetorical concepts from applied linguistics and discourse studies, we explore the nature of the interactions between both autistic and non-autistic instructors as they work together with autistic students in university settings in North America and Australia.

Objectives: By learning more about the social and academic interactions between autistic students and their instructors, especially in comparing similarities and differences between interactions when they are between two autistic people (i.e., an autistic student and autistic professor) and when they are across neurotypes (i.e., an autistic student and a non-autistic professor), we aim to identify key features of such interactions which support autistic university students to gain equitable access to learning and participation in knowledge creation at university.

Methods: This PhD doctoral project was participatory in nature in that a group of autistic graduate university students advised us through several stages of the methods; however, we were not able to attain the gold standard of participatory research (co-production from start to finish). Nevertheless, using semi-structured interviews, we interviewed 10 autistic and non-autistic instructors about their interactions with autistic university students. To analyze our qualitative data, we used a six-step reflexive thematic analysis (Braun and Clarke) to generate our themes and sub-themes with input from the advisory group.

Results: We found important differences in the ways that different instructors structure, teach, and assess outcomes for their courses depending on if they are neurodivergent, have had exposure to neurodivergent (or autistic) people, if they are not neurodivergent and yet are empathic to different styles of interaction and learning, and if they are not neurodivergent, but have limited exposure and understanding of autism.

Conclusions: We conclude that autistic and otherwise neurodivergent instructors, and non-neurodivergent instructors with personal experience interacting with autistic university students have important experiences and strategies to share with university instructors who have not encountered autistic and otherwise neurodivergent students before. These include both attitudinal and specific pedagogical strategies which will provide autistic university students with equitable access to learning and knowledge creation in university settings. We also find that use of rhetorical concepts together with the Double Empathy Problem is useful in elucidating the nature of misunderstandings between autistic university students and their instructors.

418.346 (Poster) Are Autistic Teens Better at Predicting Preferences of Autistic Peers?

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Background: Learning about others is a crucial prerequisite for successful social interactions. Typically developing (TD) adults rely on feedback and prior knowledge about similar people to learn about someone new. Autistic adolescents rely on their own preferences to learn about TD peers (Rosenblau et al. 2021), potentially because autistic individuals do not integrate information from social feedback during learning, as hypothesized by the hypo-prior account of autism. Alternatively, autistic individuals could have more social knowledge about autistic people and use this during learning.
Objectives: We had TD young adults and autistic adolescents learn about TD vs. autistic adolescents and manipulated how similar learning profiles were to the average adolescent in both diagnostic groups. We expected TD adults to have developed representations of average TD population preferences as reflected in greater predictive accuracy when learning about the average TD adolescent as compared to a TD adolescent with less average preferences or autistic adolescents. Given our prediction that autistic people have more knowledge about autistic peers, we expected autistic adolescents to have greater predictive accuracy when learning about autistic profiles, yet still use their own preferences during learning.

Methods: TD adults (N = 94) and autistic adolescents (N = 101) rated two TD adolescents’ preferences for 60 items and received trial-by-trial feedback. Separate samples of TD adults (N = 97) and autistic adolescents (N = 119) completed the same task for two autistic adolescents. To test participants’ reliance on average preferences, one presented profile was very similar to the average preference profile in each diagnostic group (a TD person similar to the mean TD profile, i.e. mean profile), while the other was maximally dissimilar (odd profile). Learning was quantified by change in prediction errors (PEs) i.e., the difference between participants’ ratings and subsequent feedback. Lower PEs reflect higher task accuracy. Average population preferences were based on self-preference ratings from TD adults (N=307) and autistic adolescents (N=285). Groups were sex-matched for direct comparisons and age was entered as a model regressor.

Results: As predicted, PEs were smallest when TD participants learned about the TD mean profile, higher for the TD odd profile, highest and indiscriminate for the autistic mean and odd profiles. Contrary to our predictions, autistic adolescents’ PEs were lower for the TD vs. ASD profiles. Both groups learned about the mean and odd autistic profiles – the conditions with highest PEs across groups. When comparing the groups’ reliance on feedback, own, and mean-preferences, feedback was a significant regressor for preference ratings across groups. A condition by mean preference interaction suggested participants relied on mean preferences when learning about TD adolescents. A group by own preference interaction suggested autistic adolescents relied more on their own preferences during the task.

Conclusions: Autistic adolescents are more accurate at predicting the preferences of TD adolescents. While both TD and ASD groups reduced PEs over time and relied on feedback to make preference ratings, autistic adolescents relied more on their own preferences across conditions. In future analyses, a well-validated computational modeling framework will test nuanced differences in social learning strategies between groups.

418.347 (Poster) Assessment of Multiple Facets of Social Connection Among Autistic Adults: Development of the Connections with Others Scale – Autistic Version (CWOS-AV)


Background: Social connectedness, the perception that one is close and connected to other people, is an established protective factor against mental health disorders. Yet, the social motivation theory of autism poses the misconception that autism represents an “extreme case of diminished social motivation.” This theory stands in stark contrast to the earlier work of numerous researchers, all of whom suggested that humans, in general, have an intrinsic motivation and need to connect with others (Baumeister & Leary, 1995; Deci & Ryan, 1985; Maslow, 1954). Work by self-advocates have also highlighted the inaccuracy of this stigmatizing notion, with work from den Houting (2020) on the toll of social isolation emphasizing an inherent preference for social connection. Building upon the research and voices of autistic individuals, research is needed to advance the understanding of the extent to which autistic individuals are motivated to socially connect. Despite this need, limited measures exist to assess levels of motivation, desire, and value associated with connecting with others (i.e., social connection) among adults, particularly autistic adults.

Objectives: This study aims to develop a measure to assess facets of social connection that is valid among autistic adults. A secondary aim is to use this measure to examine the extent to which autistic adults are motivated, desire, and value connection with others, compared to non-autistic adults.

Methods: The sample consisted of 200 participants recruited online (autistic sample M age = 35.9, SD=12.6; non-autistic sample M age = 41.7, SD=18.8). Half of the sample self-reported a diagnosis of autism. Participants completed an initial set of 35 items to assess the desire, value, enjoyment, and motivation to connect with others and provided feedback on these items. Exploratory factor analyses (EFA) were conducted using 50 participants. Confirmatory factor analyses using the remaining 50 participants were then performed.

Results: A four-factor model was produced by the EFA. Item reduction resulted in the development of the 8 item Connections With Others Scale – Autistic Version (CWOS-AV). The scale includes factors for value, similarity, sociable, and member. The CWOS-AV had a comparative fit index of 0.980, a standardized root mean square residual of 0.064, and a root mean square error of approximation of 0.097 (90%CI=0.000-0.184; p=.205). Using a comparison group of 100 non-autistic individuals, autistic participants had significantly greater CWOS-AV scores compared to non-autistic participants (t(195)=3.39; p <.001).

Conclusions: The CWOS-AV was developed to facilitate measurement of social motivation, desire, and value among autistic individuals. This measure will allow for greater ability to assess numerous facets of social connection, resulting in improved ability to produce research that clarifies theories and describes psychological phenomenon. Additionally, autistic participants had significantly greater scores on the
CWOS-AV, demonstrating higher levels of motivation, desire, enjoyment, and value associated with connecting with others. This provides clear evidence in contradiction with the social motivation theory. This, coupled with theoretical work on the human need to connect, suggests that the social motivation theory of autism cannot be generalized to all autistic people, or even most autistic people.

**418.348** (Poster) Associations between Antipsychotic Use, Severity of Challenging Behaviors, and General Attention Assessed Via Eye Tracking: An Exploratory Investigation from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT)


**Background:** Prior work has found that autistic children taking antipsychotics display a trend toward greater overall cognitive and socio-adaptive impairments. Little is known, however, about associations between antipsychotic use and attentional processes which may covary with behavioral issues. The current project explores whether antipsychotic use has a similar outcome effect on measures of social attention using eye-tracking (ET).

**Objectives:** To examine how the use of antipsyhcotics, the severity of challenging behaviors, and their possible interaction in autistic children is associated with differences in general attention to ET stimuli.

**Methods:** Data from 280 participants (M=215, F=65) aged 6-11 years with ASD, including N=20 participants using antipsychotics, were acquired from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT). Medications were classified by category and examined alongside behavioral features using standardized clinical measures including the Aberrant Behavior Checklist, 2nd Edition (ABC-2). Percentage of valid data acquired via ET (%Valid) was fit in a linear mixed model as a function of Medication use {No Antipsychotics, Antipsychotics}, ABC Raw Scores, their interaction, and an age-control-covariate.

**Results:** ANOVA revealed no main ABC Raw Score effect (p=.837), a marginal Medication effect (p=.068), significant Age effect (p<.001), and an ABC x Medication interaction (p=.008). Children on antipsychotics showed a positive relationship between ABC and %Valid (10-point ABC increase associated with 1.97% [95%CI: -0.33%, 2.52%] %Valid increase), whereas children not on antipsychotics showed a negative relationship (-0.94% [95% CI: -.485%, -1.396%]). At the highest ABC, children on antipsychotics showed lower %Valid (76.1% [95% CI: 65.3%, 86.9%]) compared to children not on antipsychotics (90.8% [95% CI: 88.4%, 93.2%], p=.009), whereas at the highest ABC, children on antipsychotics showed higher %Valid (92.2% [95% CI: 80.4%, 100%]) compared to children not on antipsychotics (77.0% [95% CI: 72.2%, 81.7%], p=.019) (Table 1).

**Conclusions:** These exploratory results suggest that antipsychotic use is associated with higher attention to stimuli for autistic children with high ABC scores and lower attention for those with low ABC scores. The most prescribed antipsychotic within this group was risperidone, an FDA-approved drug for reducing irritability in 5- to 16-year-olds with autism shown to also treat aggression, hyperactivity, and stereotypy. There are several possible (not necessarily mutually exclusive) directionals to consider for these associations: high ABC scores in children on antipsychotics may be associated with greater levels of irritability and less with attention issues compared to children with high ABC scores not taking antipsychotics; low ABC scores in children on antipsychotics may reflect antipsychotic responders with side effect profiles including lethargy and drowsiness associated with decreased ET data collection; antipsychotic use could improve general attention for children with persistently elevated ABC scores. Further analyses could investigate subdomains of the ABC measure individually, i.e., irritability, social withdrawal, stereotypic behavior, hyperactivity, etc. to hone our understanding of its relationship to attention. These results merit further exploration into eye-tracking as a potential lens to help disentangle our understanding of the effect of medication use on attention in autistic children.

2. McCracken et al., 2002, NEJM.
3. Chavez et al., 2006, Pharmacotherapy

**418.349** (Poster) Associations of Emotion Dysregulation and Autonomic Responses during an Emotion Regulation Task in Adolescents with and without Autism

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CWOS-AV, demonstrating higher levels of motivation, desire, enjoyment, and value associated with connecting with others. This provides clear evidence in contradiction with the social motivation theory. This, coupled with theoretical work on the human need to connect, suggests that the social motivation theory of autism cannot be generalized to all autistic people, or even most autistic people.
Background: Emotion regulation (ER) deficits are increasingly seen as a factor underlying mental health problems in autistic individuals. Physiological regulatory processes in the autonomic nervous system (ANS) is closely related to the ability for effective ER. Studies of resting autonomic activity in autism have reported mixed results, with between-group findings of hyperarousal, hypoarousal or null effects (Arora et al., 2021). As such, capturing the individual differences in autonomic changes during emotional processing may be a helpful approach to examine links between emotion dysregulation and ANS functioning. However, to date, no study has measured autonomic indices during task-based measures of emotion reactivity and effortful ER strategy use in autistic individuals.

Objectives: To investigate whether emotion dysregulation in adolescents with and without autism is associated with autonomic responses during ER in a laboratory task.

Methods: Twenty adolescents with autism (male = 70.0%, \(M_{\text{age}} = 16.4, SD = 1.30\)) and thirty-four without autism (male = 26.5%, \(M_{\text{age}} = 16.4, SD = 2.13\)) completed a short ER strategy training (i.e., reappraisal) at the lab and were then administered an ER task. In the task, blocks of negative and neutral images were presented. Prior to each block, participants viewed a strategy prompt that indicated either “Look” or “Decrease”. When prompted to “Look”, participants looked at the images and responded naturally. When asked to “Decrease”, participants used the ER strategy to decrease any negative emotions aroused by the negative images. After each block, participants rated their degree of negative emotion (from 1 = “very weak” to 4 = “very strong”). The task had 3 conditions: Decrease Negative, Look Negative, and Look Neutral.

Task-related physiological responses, including beat-by-beat heart rate (HR) and skin conductance (SC) measures were recorded continuously throughout the ER task. Physiological changes in emotion reactivity were reflected in difference scores between Look Negative and Look Neutral conditions. While physiological changes in emotion regulation were reflected in difference scores between Look Negative and Decrease Negative conditions.

All participants completed the Autism Quotient (AQ), while participants’ caregiver or parents completed the 7-item Reactivity Short Form from the Emotion Dysregulation Inventory (EDI). The scale measures rapidly escalating and intense negative affect, with higher scores reflecting higher emotion dysregulation.

Results: Correlational analysis in the combined sample of participants revealed significant associations between changes in HR and number of SC responses (nSCR) during emotion reactivity and the EDI. Specifically, greater increases in HR and nSCR when viewing negative images were related to higher EDI scores. However, changes in HR and nSCR during emotion regulation were not associated with the EDI.

Conclusions: The findings indicate that exaggerated physiological changes in emotion reactivity are associated with higher levels of emotion dysregulation. It suggests that ANS dysregulation may contribute to emotion dysregulation in autistic adolescents. The study highlights the utility of an individual difference approach to studying the relationship between ANS functioning and parent-rated day-to-day ER characteristics in autism. Future research will be required to examine the potential for interventions that improve autonomic balance in autistic individuals.

418.350 (Poster) Autism Symptoms Moderate Mother-Child Physiological Synchrony
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Background:
Physiological synchrony, or the dyadic coordination of physiological states, between parents and their children is foundational for socioemotional development and may represent a pathway to better understand social reciprocity in autism. Respiratory sinus arrhythmia (RSA) serves as an indicator of physiological regulation and is reduced in those with autism. Dyadic coordination of RSA with interaction partners may also be impacted in autism, with weaker RSA synchrony found in dyads of parents and their autistic children as compared to neurotypical children (Wang et al., 2021). Understanding the influence of autism symptoms on dyadic RSA synchrony can provide further evidence of its utility as a potential intervention target (e.g., paced breathing practices to provide the child with self-regulatory skills).

Objectives:
The present study aimed to determine whether autism symptom severity impacts the magnitude and direction of RSA synchrony within dyads.

Methods:
Participants included 22 dyads of mothers (\(M_{\text{age}}=39.55\)) and their autistic children (\(M_{\text{age}}=8.71\) years). Physiological data was collected during a 4-minute interaction task where the dyad was asked to copy a series of drawings using an Etch-A-Sketch. Each partner was in control of one knob to elicit goal-oriented behaviors from the dyad. The Actiheart-5 heart rate monitor captured the ECG signal, which was
then processed through CardioEdit software to correct for artifacts. RSAscents, an online program, was used to apply a time-series transformation that provides 1-second estimates of RSA across the interaction. Autism severity was assessed using the calibrated severity scores from the ADOS-2.

Results:

A mixed-effects model examined mother-child RSA synchrony and its association with autism severity. Child RSA reactivity, child task average RSA, autism severity, and their interaction were tested as predictors of maternal RSA. The interaction between child task average RSA and autism severity was a significant predictor of maternal RSA, $b=589, t(18)=4.24, p<.001$. Simple slopes analyses showed that dyads of children with higher autism symptoms demonstrated positive RSA synchrony ($p<.001$) and dyads of children with lower autism symptoms demonstrated negative RSA synchrony ($p=.018$). The main effect of child RSA reactivity and its interaction with autism severity were not significant predictors of maternal RSA ($p=.410$).

Conclusions:

Findings show that the level of autism symptom severity differentiates the magnitude and direction of RSA synchrony in mothers and children with autism. Specifically, those with higher autism symptom severity demonstrated significant positive RSA synchrony (i.e., both partners show similar levels of RSA across the task), while those with lower autism symptom severity demonstrated significant negative RSA synchrony (i.e., RSA of both partners is associated but in the opposite direction). Our findings suggest negative RSA synchrony could reflect an adaptive dyadic exchange, in which interaction partners may regulate one another’s physiology. For instance, it is possible that mothers regulated their own physiology to demonstrate a calm demeanor in the face of their child’s distress. Follow-up studies that account for the affective valence of an interaction will further clarify the patterns observed here by confirming the adaptive/maladaptive nature of negative RSA synchrony in mothers and their children with autism.


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Background: Reduced social visual attention, as measured with average gaze time to faces, is a primary feature of autism widely evaluated with the use of infrared eye-tracking. However, the reliance on region-of-interest (ROI) analysis to quantify the looking behavior of autistic individuals to specific social information (e.g., faces, eyes) does not capture the temporal sequence of eye movements (i.e., scan paths) that provides rich information related to dynamic visual attention.

Objectives: We aimed to apply a novel computational modeling approach to: (1) Evaluate whether visual processing strategies during social perception differed in autistic compared to neurotypical peers, and (2) Quantify how variability in visual processing strategy is related to variability in social, neuropsychological, and attention domains of function.

Methods: Data from 290 autistic and 109 neurotypical children aged 6-12 years old ($M=8.53, SD=1.63$) were obtained through the Autism Biomarkers Consortium for Clinical Trials (ABC-CT), a large multisite study that included multiple eye-tracking assays related to social perception (e.g., viewing social scenes, visual exploration of social and non-social objects). To capture participants’ visual processing strategy, which includes both spatial and temporal dimensions of eye movements, we utilized a probabilistic modeling approach that summarized eye movements (gaze locations and sequence) with person-specific regions of interest (ROIs) and transition probabilities among ROIs using a hidden Markov model; Common eye movement patterns were revealed through clustering.

Results: For passive viewing of static social scenes, exploratory (larger ROIs to people) and focused (smaller ROIs to people) patterns were exhibited across all participants. These eye movement patterns were exhibited by a similar proportion of autistic (Group 1 = 176; Group 2 = 91) and neurotypical (Exploratory = 70; Focused = 46; $\chi^2(1) = 0.86, 95\% CI [-0.06, 0.17], p = .35$) participants. However, for visual exploration, exploratory (ROIs specific to multiple objects) and focused (object-specific ROIs) patterns emerged across all participants with a significantly larger proportion of autistic individuals favoring an exploratory eye movement pattern (Exploratory=168; Focused = 97) compared to the neurotypical group (Exploratory = 38, Focused = 78; $\chi^2(1) = 29.27, 95\% CI [0.20, 0.33], p < .001$). Participants exhibiting a more exploratory pattern had higher adaptive social functioning scores (Vineland Adaptive Behavior Scales – III scores), lower autism social symptoms (SRS-2) scores, and lower face memory scores (NEPSY-II).
Conclusions: Participants with less adaptive social functioning, more social impairment, and poorer face memory scores used qualitatively different visual processing strategies during visual exploration of social and nonsocial stimuli in ways that converge with autism specific symptomology across social and neuropsychological domains of function.

418.352 (Poster) Autistic Preschoolers Display Reduced Attention Orientation for Social Competition but Intact Facilitation Effect from the Presence of a Parallel Competitor: Evidence from Eye-Tracking and Behavioral Data

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Background: Autistic individuals have been historically viewed as lacking social motivation and skills necessary for success in social situations. However, social motivation of autistic individuals might have been underestimated in research (Jaswal & Akhtar, 2019). Lateral tutorship, a form of parallel competition that does not involve overt interpersonal interaction, may be more suitable for promoting early learning of autistic children than interactive teaching (Mottron (2017, 2021)).

Objectives: 1) to explore visual attentional preference and processing of two scenarios of unequal interactive value, parallel competition and overt cooperation, in preschoolers with autism; 2) to address whether and how autistic children can benefit from lateral tutorship, in the form of parallel competition.

Methods: Twenty-six preschool children with autism and 20 neurotypical children matched on chronological age, sex and non-verbal IQ participated in two experiments. Experiment 1 employed a gaze-contingency task using eye-tracking technique. We measured visual attention orientation towards three videos depicting a competitive play, a cooperative play, and a non-social control stimulus. Experiment 2 included a gross motor task and a cognitive problem-solving task in two conditions, one which the participant was required to complete independently and another with the presence of a competing partner, to examine whether the parallel competition improves performance in the autistic children and neurotypical children.

Results: In Experiment 1, the autistic children displayed reduced visual orientation towards competition than neurotypical children whereas there was no such group difference for cooperation. Lower social prioritization score (subtracting the orientation toward nonsocial baseline from the orientation toward competition or cooperation) in autism than in neurotypical children was observed only for competition, but not for cooperation. Orientation toward competition increased with age while orientation toward cooperation decreased with age in the neurotypical group but not in the autism group. In Experiment 2, the presence of a competitor significantly and similarly improved performance of both the autistic children and the neurotypical children across tasks. Visual orientation to competition/cooperation was significantly correlated with cognitive problem-solving in the neurotypical group only.

Conclusions: Autistic preschoolers show reduced visual-attentional interest towards social competition. Unlike neurotypical peers, their visual interest towards competition did not increase with age. Nonetheless, the results of Experiment 2 demonstrated that participating in a parallel competition led to increased performance for autistic children to the same extent as it did for neurotypical children. Taken together, atypical social interaction preferences do not prevent autistic children from benefiting from social situations. Lateral competition/tutoring should not be over-written by joint-interactive activities in early intervention and education practice for autistic preschoolers.


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Background:

One challenge with the marked social communication difficulties in autism has been associated with the processing of emotions. Despite much research, the underlying mechanisms of emotion processing differences in autism remain poorly understood, namely whether they stem from a domain/modality-general or -specific level of processing. This is due to the limited evidence available for domains other than human faces. Equally, how such emotion processing differences in autism manifest behaviourally across domains at the implicit (automatic) and explicit (controlled) levels of processing is also an under-researched area.

Objectives:

To address these research gaps, this study investigated how autistic traits might relate to differences in implicit and explicit emotion processing across multiple stimulus domains.
Methods:

74 native Mandarin speakers (58 female; \(M_{\text{age}} = 22.72, SD_{\text{age}} = 1.80\)) completed the Autism-spectrum Quotient (AQ) to measure autistic traits, scores of which were all within the neurotypical range (< 32; \(M_{\text{AQ}} = 19.45, SD_{\text{AQ}} = 6.31, \text{range} = 8-31\)). According to a median split of AQ scores, participants were assigned to either the high (AQ > 17; \(n = 36\)) or low (AQ ≤ 17, \(n = 38\)) AQ group. A forced-choice emotion labelling task assessed explicit emotion processing, which involved the recognition of emotions across four stimulus domains (human faces, face-like objects, speech prosody, song). A cross-modal emotion priming task assessed implicit emotion processing of spoken/sung words (primes) through their influence on subsequent emotional judgment of faces/face-like objects (targets), using a stimulus onset asynchrony of 200ms and varying emotional congruence between primes and targets across trials.

Results:

Linear mixed-effects analyses revealed that for labelling, the low and high AQ groups performed similarly across conditions for both accuracy and speed. Notably, both groups recognised emotions most accurately and quickly from objects but least accurately from song. For priming, both groups showed more accurate and faster emotion recognition of targets when preceded by emotionally congruent than incongruent primes, particularly for spoken compared to sung primes. Crucially, emotion recognition of human face targets was less strongly primed by both spoken and sung emotions in the high compared to low AQ group, demonstrated by less facilitated recognition accuracy of face targets when preceded by emotionally congruent primes in the high than low AQ group (Figure 1).

Conclusions:

Results suggest no emotion processing differences across stimulus domains at the explicit level between individuals with low versus high autistic traits. While this finding contradicts some previous research, it may be a result of learnt compensatory strategies given the adult sample. Emotion processing differences were most noticeable at the implicit level, where automatically processed emotions regardless of auditory domain had a weaker influence on subsequent emotional judgment in human faces among individuals with high than low autistic traits. Altogether, emotion processing differences in individuals with high autistic traits may be explained through domain/modality-general mechanisms. This finding has potentially important translational value for understanding how emotion perception of different stimulus domains presents and interacts in autistic individuals, such as their reduced use of multisensory cues for emotional judgment in social communication.

418.354 (Poster) Autistic and Non-Autistic Adults Believe Autistic People Feel More Pain Than Non-Autistic People

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Background:

Some authoritative sources suggest that autistic people are relatively insensitive to physical pain (American Psychiatric Association, 2022; Frith, 1989; Wing, 1996). However, research on autistic people’s experienced pain has presented mixed findings, with different studies reporting hypersensitivity, hyposensitivity, or neither (Zhang et al., 2021). Similarly, based on common claims about autistic people being socially indifferent (Chevallier et al., 2012), one might expect low sensitivity to socially painful situations (e.g., exclusion). And yet first-person accounts (Acker et al., 2018) and cyberball experiments (Trimmer et al., 2017) suggest that autistic people feel hurt by rejection and ostracism.

These different accounts suggest that widespread beliefs about autistic people’s pain sensitivity may be misaligned with autistic people’s experiences of pain. The present study examined the possibility of a systematic bias in the pain sensitivity attributed to autistic people. We also investigated associations between pain sensitivity attributed to autistic people and the autonomy granted to autistic people.

Objectives:

In this pre-registered study, we investigated: 1) how much physical and social pain autistic and non-autistic participants thought they would experience in several scenarios that could be mildly painful; 2) how much pain participants estimated either an autistic or non-autistic character would feel in the same scenarios; and 3) how these pain ratings were related to participants’ beliefs about the character’s autonomy.

Methods:

We recruited autistic (\(n = 64\)) and non-autistic adult participants (\(n = 64\)) using the online platform Prolific. Participants first indicated how much pain (on a 1-4 scale) they would feel in 18 physically painful (Trawalter et al., 2012) and 10 socially painful (Deska et al., 2020) situations. Participants then read a vignette describing either an autistic or a non-autistic adult target character, and estimated how much
Background: Clinicians form initial impressions about a child’s diagnosis based on behavioral features (de Marchena & Miller, 2017); confidence in their initial impression may differ based on child’s diagnosis and characteristics such as age (McDonnell et al., 2019). Initial impressions may facilitate screening: 92% of referral-seeking children initially believed to have ASD are ultimately diagnosed with ASD (Wieckowski et al., 2021). However, research on initial diagnostic impressions has not yet identified specific behaviors used to guide these impressions. This research also has implications for a theoretical understanding of the heterogeneity of ASD.

Objectives: To identify behaviors that clinicians use to form initial diagnostic impressions of ASD and non-ASD in toddlers.

Methods: Participants were toddlers (N=51, mean age 22.9 months) from a multi-site study investigating early detection and intervention for ASD. Clinicians completed an Initial Diagnostic Impression Checklist within five minutes of meeting a child. They noted their impression as ASD or non-ASD and the “atypical” or “typical” behaviors that contributed to their impression for the following domains (clinicians indicated all domains that they used): social reciprocity, nonverbal communication, eye contact, motor mannerisms, prosody and vocalizations, facial expressions, and focus of attention. Final diagnoses, after the complete initial toddler evaluation, were dichotomized to ASD or non-ASD. The final diagnostic groups were not significantly different on race, ethnicity, maternal education, chronological age, or sex.

Results: When a child’s final diagnosis was ASD (n=32), clinicians formed an accurate initial impression of ASD in 65.6% of cases (n=21), and an inaccurate impression of non-ASD in 34.4% of cases (n=11; Figure 1). Accurate initial impressions of ASD were associated with atypical social reciprocity (n=12), nonverbal communication (n=13), focus of attention (n=11), and eye contact (n=11; Figure 2a). For children diagnosed with ASD an initial impression of non-ASD, clinicians endorsed typical prosody/vocalizations (n=6), typical eye contact (n=7), and absent repetitive motor mannerisms (n=5). When a child’s final diagnosis was non-ASD (n=19), clinicians made an accurate initial impression of non-ASD in 100% of cases (n=19; Figure 1), informed by typical behaviors of social reciprocity (n=12), nonverbal communication (n=11), focus of attention (n=10), and eye contact (n=13; Figure 2b).

Conclusions: These results have several implications: first, although 2/3 of toddlers with ASD were identifiable within a very short time, the remaining 1/3 were not classified correctly, which suggests that the initial diagnostic impression cannot be relied on to identify all cases of ASD. Second, although clinicians had the option to consider behaviors in seven domains when forming initial diagnostic impressions of toddlers, the most accurate initial impressions of ASD came from social reciprocity, nonverbal communication, eye contact, and focus of attention. Finally, the idea of prototypical or frank autism has been under consideration lately; these results suggest that such a phenomenon exists for the majority of toddler aged-children, but a substantial minority are a heterogeneous group of toddlers whose ASD requires a lengthier and more in depth evaluation.
Background: Prior to the pandemic of 2020, many families seeking social skills group intervention for their adolescents did not have access within their communities, particularly in rural areas. The pandemic created a shift to telehealth versions of many evidence-based autism interventions. Without research results to show effectiveness of interventions in new service delivery models, families and practitioners hoped for equivalent outcomes, but research activities were also extremely limited during the pandemic. This project was begun prior to 2020, with minimal pandemic disruption, allowing for comprehensive data collection under more typical conditions.

Objectives: We wanted to know if live, interactive delivery of social skills group interventions was as effective as in-person delivery of group interventions.

Methods: We used Laugeson and Frankel’s PEERS® manualized curriculum in both in-person and live online (using Zoom) delivery models. The PEERS® curriculum was used in both groups, with some adaptations to the online environment. Baseline parent-report and social interaction data were collected prior to any instruction. In-person and online groups were completed for 14 weeks. Adolescent groups and parent groups met together in both delivery models. Participants met again in person after the 14 weeks for generalization probes, participating in typical activities (i.e. fast food, bowling, playing games, and going to a museum). Social validity data were collected from therapists, parents and teens. Parents reported changes in social interactions using pre- and post-intervention measures.

Researchers used behavioral coding to measure frequency of social interactions from video recordings of baseline and generalization events and quality of social interactions, with reciprocal social interactions coded as higher quality than one-sided or passive interactions.

Results: Social validity results were strong in both therapists and parents, with online parents showing slightly higher results indicating satisfaction. Pros and cons of each model were mentioned in a focus group with therapists. Parents reported small improvements at similar rates across both in-person and online groups on standardized measures and inventories of social skills used to guide intervention. Objective behavioral coding from videos of baseline and generalization phase sessions were aligned with parent report results and social validity ratings.

Conclusions: While families may prefer in-person social skills groups for their adolescents, they cannot always access in-person services. Social validity for the online version of the group was slightly higher, perhaps because of reduced transportation burden or because there was no other way to access the intervention for some. Geographic location, extreme social anxiety and challenging behaviors were examples of barriers to in-person groups that were better suited to the online environment. Adaptation of the PEERS® curriculum was accomplished with relative ease, now made even easier in a post-pandemic world. Effectiveness of the chosen curriculum was similar for either delivery mode. This adds to the new body of literature regarding telehealth interventions for autistic adolescents and social skills interventions.

Objectives: Our primary aim was to investigate correlations between SST and variables that are known to be associated with autism. As a secondary aim, we measured SST scores in a clinical population comparing individuals who received an autism diagnosis with those who resulted negative to diagnostic assessment.

Methods: We enrolled all consecutive admissions for autism diagnostic assessment since September 2021. Exclusion criteria were IQ < 85 and SST comprehension subscale < 5 points. SST was administered as follows: after reading a short story by Ernest Hemingway, participants were asked questions that assessed mental state reasoning (SST-MS) and comprehension of non-mental content (SST-C). An investigator blind to SST outcome conducted the ADOS-2 interview. IQ was measured with WASI-II. Self-report questionnaires were used for autistic traits (AQ, Social Responsiveness Scale 2 [SRS-2]) and empathy (Empathy Quotient [EQ], Interpersonal Reactivity Index [IRI]).
Results: There were 25 participants with autism diagnosis and 8 without autism diagnosis. No significant difference was found between the two groups in IQ, AQ, EQ, SRS-2, and IRI scores. No significant difference was observed in SST-C and SST-MS. There was a significant difference in ADOS-2 score (U=41, p=0.01). Focusing on autistic participants, SST-C was positively correlated with IQ scores (r=0.58, p=0.002) and negatively with IRI personal distress subscale (r=-0.43, p=0.03). SST-MS was positively correlated with IQ scores (r=0.40, p=0.048) and negatively with ADOS score (r=-0.42, p=0.02). Of note, SST did not correlate with any other measure.

Conclusions: We found a negative correlation with ADOS-2 for SST-MS, but not SST-C, suggesting that autistic traits are specifically associated with difficulties in mental state reasoning in SST. Correlations between IQ and SST are greater for SST-C, indicating that mental state reasoning is less dependent on general intelligence than non-mental text comprehension. Non-significant differences between the two groups are probably due to the limited number of non-autistic subjects. Even though this is a preliminary study with a limited sample, it strongly suggests the opportunity to further investigate SST as a tool to evaluate ToM in autism diagnostic assessment for adult individuals.

418.359 (Poster) Conducting Head-Mounted Eye-Tracking Research with Young Children with Autism Spectrum Disorder

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Background: Recent technological advances in head-mounted camera method have allowed researchers to study young children’s gaze behaviors in ecologically valid contexts, such as social live interaction and solo play (Sun & Yoshida, 2022; Yoshida & Smith, 2008; Yu & Smith, 2013; Yurkovic-Harding et al., 2022). This method has great potential to further our understanding of relationships between child’s visual input and parent’s behaviors that may support early perceptual experiences critical for learning. While the method has great potential for studying learning mechanisms for young children with autism spectrum disorder (ASD), it has been used primarily among typically-developing children (but see Perkovich et al., in press; Yoshida et al., 2020; Yurkovic et al., 2021; Yurkovic-Harding et al., 2022). This may be due to methodological challenges, including sensory sensitivities, social-communication difficulties, and challenging behaviors (e.g., disruption and elopement), creating a barrier to quality data collection.

Objectives: The purpose of this session is to share our current practices that optimize the head-mounted camera (specifically head-mounted eye tracking) data collection. These suggested practices are based on our past and ongoing research with toddlers and children with ASD but also have potential applicability for collecting similar data among young children with other developmental disorders.

Methods: In this study, we used head-mounted eye-tracking data from 35 children with ASD (Younger Group [<5 Years Old]: 18, Older Group [>5 Years Old]: 17) during a parent-child play-session for 5.33 minutes (see Figure 1 for set-up). Children were grouped into the ASD group using scores from the Autism Diagnostic Observation Schedule (ADOS) (Lord et al., 2000) or the Autism Diagnostic Observation Schedule, Version 2 (ADOS-2) (Lord et al., 2012), which were administered by research-reliable administrators. No auditory or visual impairments were reported.

Results: The success rate in gathering eye-tracking data in this sample of children with ASD was 91.4%. Three of 35 children failed to complete the play-session, resulting in a 83.3% success rate among younger participants and a 100% success rate among older participants. There were numerous “challenging” behaviors relevant to the current research method. The most common challenging behaviors included taking the eye-tracker device off (younger: 83.3%; older: 23.5%), elopement (younger: 55.5%; older: 23.5%), and becoming distressed (younger: 50.0%; older: 11.8%). Overall, 88.8% of children in the younger age range and 29.4% of children in the older age range exhibited at least one challenging behavior.

Conclusions: Head-mounted camera method has the potential to reveal early, socially-relevant gaze behaviors relevant for identifying precursors and contributors to early learning among children with ASD (Falck-Ytter et al., 2013). However, challenges of using the technology in this population currently prevents its use. In this presentation, we will overview strategies our team uses to obtain high rates of successful data collection even when challenging behaviors are present. By accumulating workable practices and guidelines, this work has the potential to improve awareness of the feasibility of these methods and the utility of results, ultimately expanding research opportunities for children with autism and other developmental disorders.

418.360 (Poster) Correlates and Turning Points of Adaptive Functioning Trajectories and Longitudinal Associations with Autism Symptoms from Early Childhood to Adolescence

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Background: Recent advances in the understanding of autism spectrum disorder (ASD) have brought about a growing demand for longitudinal data to address the changing nature of autism and to understand its trajectory over time. This is particularly important as the older child population is growing and new research questions arise about the nature of the disorder over the course of development.

Objectives: The objective of this study was to identify correlates and turning points of adaptive functioning trajectories using a longitudinal design.

Methods: The sample included 164 children with ASD who were followed from early childhood to adolescence. Adaptive functioning was measured using the Vineland Adaptive Behavior Scales, Second Edition (VABS-II) at each time point. The study was conducted in three sites: Toronto, ON, Canada; Edmonton, AB, Canada; and Tel Aviv, ISRAEL. The sample was divided into three age groups: early childhood (ages 3-6), middle childhood (ages 7-11), and adolescence (ages 12-18). The study used a mixed-methods design, including quantitative analyses and qualitative interviews.

Results: The study found that early childhood adaptive functioning was positively correlated with the VABS-II scores. Gains in adaptive functioning were observed in middle childhood, with a plateau in adolescence. The study also identified several correlates of adaptive functioning, including social and communication skills, and family support. Turning points were identified in the early childhood period, with significant gains in adaptive functioning noted in middle childhood.

Conclusions: The study highlights the importance of early intervention and support for children with ASD, with gains in adaptive functioning observed in middle childhood. The findings underscore the need for ongoing support and intervention to help maintain and enhance adaptive functioning in adolescence. The study also provides valuable insights for future research on the nature of autism spectrum disorder over the course of development.
**Background:** Previous research has shown that heterogeneous trajectories of adaptive functioning in autism are associated with baseline characteristics such as autism symptom severity and IQ. However, evidence remains limited regarding to what extent the developmental variability of adaptive functioning can be accounted for by family characteristics and autism symptoms beyond baseline. It is also unknown whether turning points are present along the trajectories reflecting potential risk or opportunities for change.

**Objectives:** We aimed to examine 1) the parallel-process trajectories of communication, daily living, and social skills from ages 2 to 17 years in an inception cohort of autistic children, and 2) the developmental variability of adaptive functioning and associations with child/family characteristics and autism symptom trajectories.

**Methods:** The current sample (N=406; all diagnosed with autism at ages 2-5 years) was drawn from *Pathways in ASD*, a large Canadian prospective study. Children’s adaptive functioning and autism symptoms were respectively assessed with Vineland Adaptive Behavior Scales (VABS) and Autism Diagnostic Observation Schedule (ADOS) across 4 to 6 visits, with data restructured by chronological age for parallel-process latent growth curve modeling. Upon deciding the optimal functional form, latent class growth analysis was performed to identify VABS trajectory subgroups. Child (sex, age of diagnosis, baseline nonverbal IQ) and family characteristics (household income, caregiver’s education, race/ethnicity, and nativity), and ADOS growth parameters were included to examine their associations with VABS trajectory subgroup membership.

**Results:** The piecewise latent growth model best described VABS trajectories with two turning points identified at transitions into school age (~6 years) and youthhood (~10 years). We parsed four VABS trajectory subgroups (entropy=.92; Figure 1) that vary by functioning level, change rate for certain VABS domains, and developmental periods segmented by the turning points. Household income and nonverbal IQ, but not autism symptom severity at baseline, remained significant covariates of VABS trajectory membership when adjusting for other covariates. About 16% of our sample was in Class 4, which is characterized by notable early growth across VABS domains and less decline in social functioning upon transitioning into youth. Children in Class 4 had higher yet highly variable nonverbal IQ (M=82.4, SD=25.8) at diagnosis, showed more reductions in social-affect symptoms across childhood (Figure 2), and were more likely to come from a higher-income family (b=.37 to .52, all SE=.13, p<.01). In contrast, the lowest functioning group (Class 1; 20% prevalence) was marked by an early decline across VABS domains despite reductions in autism symptoms, followed by late improvement (particularly in daily-living skills) during school age and then decline in adolescence.

**Conclusions:** This study demonstrated the heterogenous pathways of adaptive functioning domains across developmental stages in autism. We identified key individual and family correlates of developmental variability (e.g., nonverbal IQ, household income) as well as crucial transition periods for functional declines or improvement, which have important implications for understanding risk and resilience processes leading to various developmental outcomes. Our findings highlight the significance of taking developmental and multidimensional approaches to studying autism-related outcomes and thus informing timely and tailored supports for individuals on the spectrum.

418.361 (Poster) Correlation between Gaze Behaviors and Social Communication Skills in Autism: A Meta-Analysis

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**Background:** In a recent literature review, researchers found that the correlation coefficients between gaze behaviors and social communication skills of young children at risk or with autism varied a lot across studies. However, it is not clear whether the variation of reported correlations can be explained by factors such as quantified gaze metrics of gaze behaviors, defined interest areas of displayed stimuli, or behavioral assessment measures of social communication skills.

**Objectives:** The purpose of this study was to conduct a meta-analysis on the correlation between gaze behaviors and social communication skills of young autistic children. Specifically, the following questions were addressed: (a) what is the average correlation between the measures across the studies and (b) how do the correlation coefficients vary by different gaze metrics, areas of interest, and behavioral assessments?

**Methods:** We conducted a systematic search process following the PRISMA analyses statement (PRISMA; Page et al., 2021). The search yielded a total of 380 articles. After removing duplicates, two authors independently screened the title and abstract of the remaining 201 articles, which resulted in 57 studies for full-text review. Then, a total of 21 articles remained for data extraction; four studies were excluded during the data extraction. We conducted a meta-analysis on the correlations and employed meta-regression to examine how the variations of correlation coefficients can be explained by three moderators: gaze metric, area of interest, and behavioral assessment.

**Results:** A total of 17 studies were included in the final analyses. For research question 1, we first tested the fixed-effects model, which suggested that the correlation coefficients were heterogeneous at the population level (I² = 84.53%; p < .01). Thus, we rejected the fixed-effects model and proceeded with a random-effects model. The random effects analysis indicated a mean correlation of -0.096, with 95% confidence limits from -0.213 to .020. This is a weak correlation (Cohen, 1988) and indicates that, on average, there is a weak linear relationship between autistic children’s gaze behaviors (e.g., attention, gaze following) and their social communication skills. For research
question 2, we conducted mixed-effects meta-regression, which suggested that only gaze metrics ($Q_M^{[21]} = 129.28, p < .0001$) and behavioral assessment ($Q_M^{[15]} = 121.25, p < .0001$) were significant moderators while controlling other moderators. Specifically, gaze transition, which is the frequency or the number of gaze movements the child made between areas of interest, was a significant independent predictor within the gaze metric moderator. Within the behavioral assessment moderator, ADOS Item Eye Contact, ESCS Responding to Joint Attention, and four domains of VABS (Adaptive Behavior Composite, Communication, Daily Living Skills, and Socialization) were significant independent predictors of the relation between gaze behaviors and social communication skills of young children at risk or with autism.

Conclusions: Results from the meta-analysis can be used to inform our understanding of the core social communication skills of young autistic children that are likely to be presented in real-life settings, as well as later in their childhood. Limitations and implications are to be discussed.

418.362 (Poster) Dehumanizing Descriptions of Autistic Children Lead Non-Autistic Children to View Them As Less Human
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Background:

Despite efforts to increase public autism awareness, negative social attitudes towards autistic people remain. One reason for these persistent negative attitudes could be the harmful language that is used to talk about autistic people, even in well-meaning scientific and public communications. For example, autistic people report feeling dehumanized by scholarly accounts that deny that autistic people could form a community, or that suggest that autistic people are not people in a psychological sense (e.g., Botha, 2021).

Although dehumanization – the belief that an individual or group is less than fully human – is a relatively understudied phenomenon in autism research (but see Cage et al., 2018; Parker et al., 2018), dehumanization is a widespread social phenomenon that develops early (even children as young as five years old dehumanize their outgroups) and predicts endorsement of harm towards the dehumanized group. Thus, it is important to consider how dehumanization of autistic people develops, especially during the socially-formative years of childhood.

Objectives:

The current study investigated the influence of dehumanizing language on non-autistic children’s attitudes towards autistic peers by introducing children to two novel groups. Both groups were designed to reflect the behaviors of autistic people; the only difference between the two groups was whether they were described with dehumanizing or humanizing language.

Methods:

Participants were 101 8- to 10-year-old children, who each heard both the dehumanizing vignette (which described the character as missing something in their brain and as unable to understand others’ thoughts and emotions) and the humanizing vignette (which described the character as neurologically different, but capable of understanding others’ thoughts and emotions). After both vignettes, children completed two dehumanization scales: one measuring blatant dehumanization, and the other measuring subtle, trait-based dehumanization. We also measured children’s self-humanization by asking them to rate “kids like themselves” on both dehumanization scales. Then, children completed a child-appropriate measure of social dominance orientation (SDO), which prior research has identified as an important predictor of dehumanization. Finally, children were asked to indicate whether they were familiar with autism.

Results:

We hypothesized that children would engage in more blatant and subtle dehumanization of the autistic-like group that was described with dehumanizing language than the group that was described with humanizing language. Consistent with this hypothesis, non-autistic children dehumanized both of the autistic-like groups relative to themselves, but they engaged in more dehumanization after hearing a group described with dehumanizing rather than humanizing language, $t(100)s > 4.2, p < .001$ (see Figure 1).

Our second hypothesis was that individual differences in SDO would predict dehumanization of the autistic-like groups; however, this hypothesis was not supported, $ps > .26$ (Figure 2).

Conclusions: In a follow-up study, we are investigating the downstream effects of dehumanization on non-autistic children’s attitudes (e.g., towards educational policies that affect autistic people). This line of research provides empirical evidence that the ways in which autistic people are described can influence the degree to which others view them as human, and therefore should motivate more humanizing depictions of autistic people in science and society.
**Background:** Since the identification of autism as a condition of neurodiversity, participants in autism research have been of limited race and ethnicity (R&E) (i.e., primarily white). Awareness of this selectivity has led to calls for greater inclusion of autistic participants from diverse R&E groups (Maye et al., 2021). Research has increasingly focused on the R&E difference in identification/diagnosis (e.g., age of diagnosis) and access to services (Suhrheinrich et al., 2021). However, there has been little information about R&E difference in development and learning across the childhood and adolescent years. In this secondary analysis, the communication, social, and adaptive behavior of autistic children and youth from different R&Es were examined.

**Objectives:** To examine similarities and differences in the development for autistic children of different ages from different R&E groups.

**Methods:** This secondary analysis incorporated data from four research studies originally designed to investigate the effects of educational interventions in early intervention of school settings. The age groups included were toddler (18-36 months), preschool (36-60 months), later childhood (72-120 months), and adolescents (14-18 years). There were 1382 autistic participants across the four age groups (see Table 1). All but one of the studies took place in multiple geographic locations in the U.S. Developmental measures were collected at the beginning of their participation in the study and again at the end, allowing for an examination of change across time within different groups of children. Although multiple measures were collected, the one standard measure across age-groups that generated age-equivalent scores was the Vineland Adaptive Behavior Scale (VABS). The social, communication, and daily living skills-adaptive behavior domains of the VASB were analyzed for this study. A linear mixed model was used to examine stability and change among participants from different R&E groups over time and control for participation in different experimental conditions (Laird & Ware, 1982).

**Results:** Longitudinal analyses of the VABS found significant growth across age and R&E groups for communication, social, and daily living skills domains of adaptive behavior (p < .001 for all three domains). Figure 1 provides an example of the VABS Communication domain (i.e., mean).

This trend occurred for the other two VABS domains also. Participants, however, lagged behind expectations for chronological age. R&E differences became most pronounced in the Later Childhood and Adolescent groups. In high school, white children showed significant growth across time. In contrast, Black autistic adolescents maintained their skill levels over time, while Hispanic and Asian adolescents.

**Conclusions:** As has been found in other classic studies (Sigman & Ruskin, 1999), autistic children and youth do make developmental progress over time, but for many, their progress lags behind chronological age expectations. By documenting similar trends occurring across R&E groups until adolescence (and starting in later childhood for the Asian group), the findings are consistent with possibility that educational services may moderate the R&E differences at least until adolescents, with Asian students as the exception. More focused prospective examinations of these trends in future research is recommended.

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**418.364 (Poster) Different Together: Prosodic Network Communities in Speakers with and without ASD**

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**Background:** Speakers with autism spectrum disorder (ASD) are commonly reported to have atypical voice and prosody that impact impression formation. Human raters seem to be adept at detecting acoustic cues that may suggest the presence of autism, but a clear acoustic characterization of the “autistic voice” has remained elusive. This suggests the possibility that a) there may not be any single pattern of acoustic features that defines the vocal patterns of people with ASD, and b) there may be a variety of acoustic profiles which, while quantitatively quite different, may all still be perceived by hearers as suggestive of autism. To investigate this possibility, we modeled the speech from a small selection of speakers, with and without ASD, producing single sentences, as a network of nodes defined by acoustic features, and used a community-detection algorithm to identify clusters of speakers who were acoustically similar. We then compared these clusters with the ratings of expert clinicians and naive raters.

**Objectives:** Our objective was to investigate whether grouping speakers with and without ASD, on the basis of acoustic features alone, could yield insight into the cues human hearers pick up on when rating speech for atypicality.

**Methods:** Participants (N = 27) produced single, scripted sentences. From the audio files of the recordings, we extracted four acoustic features: fundamental frequency (pitch), jitter (a measure of voice quality), speech rate, and articulation rate. We modeled speakers as a network of nodes, in which each node used the acoustic features to represent the speaker, and connections were calculated as partial correlations between nodes. We then used a spin-glass community detection algorithm to identify “communities” of speakers who share similar acoustic properties, compared to the other speakers. Network stability was assessed by a variety of measures, including comparing
the modularity of the network with random networks. Finally, we compared the algorithmically-identified communities with ratings by trained clinicians and naive raters.

Results:

Three communities (acoustic profiles) were reliably identified in the network (Fig 1A). These consisted of a community of predominantly speakers with ASD, a community of predominantly NT speakers, and a third community which was a nearly even split. Both expert and naive raters were reliably able to distinguish NT speakers from speakers with ASD, however only the raters with clinical experience could confidently identify the two speakers with ASD who were placed in the predominantly TD community (Fig 1B).

Conclusions: The confidence of the raters supports findings indicating that hearers are adept at identifying atypicalities in prosodic and vocal patterns that may be characteristic of people with autism. At the same time, the stability of the three-community network suggests that there may not be any single acoustic profile that describes the “autistic voice”. Rather than broad descriptions of the speech of people with ASD as “monotone” or “robotic”, we may need to focus attention instead on how each individual uses the prosodic tools available to them to communicate meaning and intention.

418.365 (Poster) Displays of Positive Facial Affect Differences in Autistic and Non-Autistic Adults across Contexts and Are Associated with More Favorable First Impressions

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Background: Autistic people often receive unfavorable first impressions from non-autistic (NA) people (Morrison et al., 2020), likely because of stigma related to non-normative social presentations and expressive behaviors (Sasson et al., 2017). Although facial expressivity influences first impressions (Koji & Fernandes, 2010), no research has examined whether expressivity differences in autism relate to the formation of first impressions by NA people. Further, it is unclear whether facial expressivity in autism varies depending upon contextual demands and whether this affects first impressions (Koji & Fernandes, 2010).

Objectives: To determine whether facial expressivity predicts first impressions of autistic adults made by NA adults in two disparate contexts.

Methods: Twenty-one autistic and 21 NA adults, comparable on age (M_A = 26.62; M_NA = 23.52), sex (15 autistic and 16 NA males), ethnicity (18 Caucasian in both groups), and IQ (M_A = 109.67; M_NA = 114.00) were video recorded interviewing for their ideal job and discussing a personal interest. The percentage of video frames displaying positive affect was quantified using iMotion software that classifies emotional expressions and has previously been used in autism research (Bilikis et al., 2020; Trevisan et al., 2016). Later, 977 NA undergraduates rated these participants using the First Impression Scale (Sasson et al., 2017).

Results: A repeated measures ANOVA with diagnosis and sex as the between group variables and context as the within group variable revealed a main effect of diagnosis (F(1,38)=5.76, p=.02), with NA participants demonstrating greater positive affect, and a main effect of context (F(1,38)=9.42, p<.01), showing greater positive affect in the interest relative to the job context (see Figure 1). The diagnosis X context interaction did not reach significance (p=.50). Female participants trended towards more positive affect than males (p=.08), but sex did not significantly interact with diagnosis or context. For both groups, positive affect significantly correlated with more favorable first impressions in the interest context for likability (r=.36) and attractiveness (r=.33) and was associated with greater interest in hanging out with (r=.34) and having a conversation with (r=.32) the participant. These patterns were attenuated in the job context, with positive affect showing trend-level correlations with likability (r=.30), hanging out with (r=.27) and having a conversation with (r=.29). Correlations were no longer significant when examined in each diagnostic group separately, likely due to statistical power.

Conclusions: Facial expressions of positive affect were greater in NA relative to autistic adults and were associated with more favorable first impressions formed by NA raters on several trait judgments and indices of social interest. Thus, NA raters may use normative signifiers of positive affect when forming first impressions, and this may contribute to the poorer first impressions autistic people receive from NA people. Future work should determine if autistic raters are less likely to demonstrate this bias, and whether automated facial expressivity software normed on NA people adequately captures expressivity among autistic people. Additionally, findings indicated that expressivity in autistic adults is influenced by contextual demands in similar ways to their NA counterparts that may influence the formation of first impressions.

418.366 (Poster) Dissecting the Role of Emotion Dysregulation in Core Autism Symptoms

Background: Emotion regulation has emerged as an underpinning for numerous psychological and neurodevelopment disorders and likely plays a key role in ASD. Individuals with ASD tend to be more emotionally reactive and less introspective than typically developing individuals (Mazefsky, 2013). The Emotion Dysregulation Inventory (EDI) is a novel measure of emotion dysregulation in ASD that can be used for any level of cognitive or verbal ability and highlights emotion reactivity and dysphoria. Reactivity refers to poor regulation, intense and swift escalation of negative emotions; dysphoria refers to negative emotions such as sadness, nervousness, or anhedonia (Mazefsky, 2018). Because relations between these features and core ASD symptom domains have not widely been explored, we examined relations between EDI scores and core autism features, as indexed by the Social Responsiveness Scale, 2nd Edition (SRS-2) and Repetitive Behavior Scale, Revised (RBS-R).

Objectives: To evaluate how domains of emotion dysregulation are related to the core ASD symptoms. We hypothesized that more emotionally reactive children would score higher on all Social Responsiveness Scale (SRS-2) and Repetitive Behavior Scale (RBS) domains. Conversely, we hypothesized that children with more dysphoria would score lower on the SRS and RBS.

Methods: Parents of 60 children (52 male, 8 female) with ASD, ages 6 to 11 (8.316±1.751) completed the EDI, SRS-2, and RBS-R questionnaires. All children had their ASD diagnosis confirmed by a clinical psychologist who used ADOS-2 and/or ADI-R, DSM-5 criteria, and clinical judgment. We ran two-tailed, Pearson bivariate correlations between EDI reactivity and dysphoria and all domains of the RBS-R and SRS-2.

Results: Emotion reactivity significantly positively correlated with the total score of the SRS (r=0.46, p<0.001), as well as the social cognition (r = 0.46, p<0.001), social communication (r = 0.34, p = 0.008) and repetitive subdomains (r=0.50, p<0.001). Reactivity did not relate to social awareness or motivation, and dysphoria did not relate to SRS total score or any subdomain. Emotion reactivity was significantly positively correlated to the overall score of the RBS-R (r=0.50, p<0.001), as well as to the stereotyped behavior (r = 0.41, p = 0.001), the self-injurious behavior (r = 0.41, p = 0.001), the compulsive behavior (r = 0.41, p = 0.001), the sameness behavior (r = 0.55, p<0.001), and the restricted behavior (r = 0.32, p = 0.012) subscales of the RBS-R. Dysphoria was not significantly correlated to any RBS-R domain.

Conclusions: Emotion reactivity significantly correlated with several domains of both social impairment and repetitive behavior, whereas dysphoria did not significantly correlate with any domains. These findings suggest that emotion reactivity is centrally linked to core autism spectrum disorder symptoms, which may mean that intervention teaching emotion regulation to individuals with ASD could lead to diminished core symptoms and improved overall social functioning. In contrast, dysphoria may be more orthogonal, suggestive of comorbidity and requiring specific intervention that might have less impact on core autism symptoms even when successful.

418.367 (Poster) Do Neurotypical People Have Autistic Theory of Mind Abilities? Insights from a Focus Group Study

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Background: The hypothesis of a universal Theory of Mind (ToM) impairment in autism was the basis of ages of literature in pragmatics, even though experimental evidence demonstrated that ToM difficulties are not universal or could be better explained in other ways (Gernsbacher & Yergeau, 2019). Contributions from autistic academics opened the field to the possibility that communication difficulties might occur because cross-neurotype communication involves different constructs of the other’s ToM, rather than because of deficits within a specific neurotype. The potential application of the double empathy problem (Milton, 2012) to mutual comprehension has only recently been explored in pragmatics (Williams 2021), and it might benefit from an exploratory focus group study.

Objectives: This exploratory study aims at exploring autistic perceptions of cross-neurotype communication with a focus on ToM and indirect speech acts (ISAs).

Methods: Twelve Italian autistic adults without intellectual disability were recruited via email and participated into two Virtual Focus Group Discussions (VFGD) of 90 minutes each, held on Zoom with two facilitators: an autistic researcher with a background in Psychology, focusing on pragmatic and ToM literature, who moderated the session, and a neurotypical assistant. Informed consent was obtained from participants for recording the VFGDs. Each VFGD started with an introduction including background definitions of (neurotypical) ToM and ISAs, the purpose of the VFGD, basic rules for the discussion and three open-ended questions. The VFGDs were manually transcribed according to the orthographic transcription rules of Italian oral texts adopted in the CLIPS project (Savy, 2007). The transcripts were analysed following the seven steps described by Colalizzi (1978); the analysis was presented back to the participants for validation.

Results: Three main themes emerged from the analysis. Participants reported a variety of experiences of being misunderstood in cross-neurotype communication, including the idea to be negatively judged because of a sincere statement perceived as rude, the observation that
neurotypical people in their life tend to derive implicit meaning from their direct speech acts that were not intended to be communicated, and the feeling of being perceived as not paying attention when, in fact, they were. These experiences occurred both with co-workers and strangers and in intimate and familiar contexts.

Conclusions: The results indicated that participants experienced difficulties in communication that were rooted into mutual misunderstanding, rather than in their ability to comprehend the neurotypical counterpart, and into a perceived difference between the neurotypical and autistic ToM. Further studies evaluating this phenomenon from a quantitative point of view would be needed. Nevertheless, awareness of these experiences might result in reduced misunderstandings in cross-neurotype communication.

418.368 (Poster) Do Shapes Have Feelings? a Remote Administration of the Social Attribution Task in Autistic Children


Background: The social attribution task (Heider & Simmel, 1944) is a video-based paradigm to assess the tendency to assign feelings to and anthropomorphize the movements of geometric shapes. Over the past 20 years, research has shown that performance on this task differs for autistic vs. non-autistic children (Klin, 2000; Klin & Jones, 2006), such that autistic children are less likely to ascribe thoughts and feelings to geometric shapes than non-autistic children, and instead describe interactions using causal, spatial language. However, these studies had several limitations, including primarily male samples and lab-based methods that could have led to non-representative behavior. Given that sex differences in autistic speech are increasingly recognized (Cola et al., 2022) and home-based data collection could provide a more ecologically valid snapshot of children’s everyday behavior, the current study aims to collect a sex-balanced sample of the social attribution task via teleconference from children’s homes.

Objectives: (1) Assess whether 48 children aged 6-18-years-old can reliably complete a social attribution task at home via telephone and internet; (2) Determine whether children’s language patterns differ by diagnosis.

Methods: A preliminary sample of 16 autistic and 18 non-autistic children matched on age and IQ (Table A) participated in a telehealth study which involved completing multiple activities including a social attribution task. Children watched two silent 40-second videos of shapes moving in semi-social patterns twice (Figure 1; Abell, Happe, & Frith, 2000) and were asked to describe what the shapes were doing on the second viewing. The first video depicted the shapes moving intentionally, alternating friendly and unfriendly. The second video depicted the shapes moving in random patterns. Children answered three questions about the videos: “Do the shapes have feelings?”, “What else were the shapes feelings?”, and “Are the shapes friends or not friends?”. Total word count, and proportion of words that were adjectives, emotional words, social words, and cognitive process words were examined using LIWC2022 (Pennebaker, 2022).

Results: Autistic children used a smaller proportion of adjectives, emotional, social, and cognitive process words relative to their overall vocabulary in comparison to the non-autistic control group. Autistic children also used more words overall when compared to the non-autistic group. Although group differences were not statistically significant, they were consistent with previous literature. When the full sample has been processed, we will have additional power to confirm our preliminary findings to assess potential sex differences in the language produced by autistic and non-autistic children.

Conclusions: Home-based samples of the social attribution task, using balanced groups of girls and boys with and without autism, could help update our understanding of how children interpret the world through lenses that are more or less social. Stable, significant results could suggest an easy and reproducible way to track children’s social development from afar, as well as shed light on how autistic behavior may differ in familiar environments vs. lab-based contexts. These preliminary data are promising, and we are eager to present findings from the full sample of 48 participants (half autistic, half female) collected and transcribed in May 2023.

418.369 (Poster) Looking at Me Anxiety: A Qualitative Study of Gaze Anxiety in Autism

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Background: Anxiety and differing gaze behaviour are two common characteristics of autistic adults. In the neurotypical population, facial gaze can ensure emotional regulation and social learning that may aid in reduced prevalence of anxiety. Many studies can be found for anxiety and autism, and gaze behaviour and autism however, few link the two. Moreover, there are limited qualitative studies regarding anxiety and eye contact found in the literature, none exploring the eye contact and anxiety relationship. Investigating how anxiety and gaze...
behaviour are related may provide insights to this heterogeneous cohort, helping anxiety intervention development in the autism population. Consequently, qualitative studies are needed to provide inductive insights into this relationship.

Objectives: To explore the lived experience of those adults on the autism spectrum in relation to anxiety and eye contact.

Methods: A qualitative study was carried out with 16 autistic adults and 7 supporters of autistic adults. Data was collected from semi-structured interviews and analysed using Charmaz's Grounded Theory epistemology.

Results: Autistic individuals reported having difficulties with gaze behaviour, with related anxiety effects. Themes show that autistics can change their gaze behaviour to appear “normal”, reduce anxiety in social situations, and allow other sensory modality processing (e.g. avoiding facial gaze to allow verbal language to be processed). Eye contact was found to relate to feelings of anxiety. However, anxiety was reported to be caused more by social situations than eye contact alone. Participants reported symptoms of alexithymia and face blindness that affect their everyday social functioning.

Conclusions: Autistic adults can be very informative about their gaze behaviours and causes of anxiety. However, interviews revealed that while most causes of anxiety are social in nature, specific aetiology and remediation of the anxiety is complex and well communicated by those on the spectrum.


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Background: Laughter is normally viewed as a spontaneous emotional expression of positive internal states; however, it more often serves as a social signal in communication. Although genuine and social laughter are both salient communicative signals, they are also very different: they are acoustically distinct, they play different roles in the communication of emotional and social meaning, their perception and production recruit different neural systems and these differ between certain populations. Intriguingly, genuine laughter has been found to amplify the funniness of jokes more than social laughter amongst both non-autistic and autistic adults.

Objectives: The current study aims to extend our understanding of implicit laughter processing by adding genuine or social laughter to a variety of forms of humour stimuli including pun jokes, burp sounds and slapstick videos, and to see how it affects people's perceived funniness of humorous stimuli. In addition, we further investigated whether the same pattern of implicit processing of genuine and social laughter in non-autistic participants could be found in autistic participants.

Methods: Three participant datasets of autistics and non-autistic adults were recruited; the two groups of participants were comparable on age, gender, and IQ across all datasets. In dataset one, 24 autistic and 26 non-autistic participants completed a task involving the implicit modulation of funniness of pun jokes by laughter (joke study). In dataset two, 28 autistic and 30 non-autistic participants rated the same joke but without laughter this time, and also completed two tasks involving the implicit modulation of funniness of burps (burp study) and of slapstick videos (video study) by laughter. A third set of 37 autistic and 31 non-autistic participants were recruited online to follow up the findings from the video study.

Results: Across a variety of humour stimuli, including pun jokes, burp sounds and slapstick videos, the addition of laughter increased the funniness of humour stimuli perceived in the non-autistic group; they also found the humour stimuli funnier when paired with genuine than social laughter. In contrast, the same laughter modulation effect was only found for the pun jokes in autistic adults.

Conclusions: The addition of laughter and the types of laughter modulated the perceived funniness of humour stimuli in non-autistic adults. However, this effect was not consistently found in autistic adults. In general, autistic adults with high intelligence have a different pattern of implicit processing of laughter relative to non-autistic adults. This lines up with our previous finding about personal experience of autistic adults, who report struggling to understand the social meaning of others’ laughter. Taken all together, autistic adults are likely to use different strategies to understand laughter and they experience a different perceptual pattern of laughter in everyday life, which could lead to difficulties in social communication since laughter is a crucial social signal for us to establish and maintain social bonds.

418.371 (Poster) Early Executive and Social Functioning Predict Externalizing Problems in Neurodiverse Preschoolers

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Background: Children with autism present with increased externalizing problems (EP) such as aggression, defiance, and inattention compared to the general population (Joshi et al., 2010). EP are also present in other developmental disorders and are associated with increased anxiety and depression, peer rejection, and parental stress (Baker et al., 2003). Understanding early predictors of EP in children with developmental disorders is imperative to identifying vulnerable children and implementing preventative interventions. Early
predictors of elevated EP in general population include impaired executive functioning (EF), the cognitive processes that facilitate goal-directed behavior (Schoemaker et al., 2013), and lower social functioning (SF), the skills that facilitate interpersonal interactions and relationships (Bornstein et al., 2010). Similar links between EF impairment and EP have been found in school-age children with ASD (Vogan et al., 2018), although the longitudinal links between EF, SF, and EP in preschoolers with ASD have not been established.

Objectives: Determine if 1) EF and SF at age 3 predict externalizing problems at age 5 in children with developmental disorders and 2) this relation differs depending on level of autism symptoms.

Methods: Participants included 59 children with a range of developmental challenges including ASD (n=34), developmental delays, ADHD, and affective and regulatory difficulties (n=25) who participated in a longitudinal study at Time1 (M-age=39.2 months) and Time2 (M-age=61.5 months). EF was assessed using the Behavior Rating Inventory of Executive Function Preschool Version (BRIEF-P). SF was assessed using the Socialization Domain of the Vineland Adaptive Behavior Scales-II (VABS-II), and externalizing problems were measured using the Early Childhood Inventory-5 (ECI-5) conduct disorder and oppositional defiant disorder scales. Pearson’s r correlation analysis was used to examine the association between Time1 predictors and Time2 externalizing problems in the combined groups. Multiple regression was used to evaluate the contributions of Time1 EF, SF, level of autism symptoms (ADOS SA), and cognitive abilities (Mullen Scales: Nonverbal DQ) to Time2 externalizing problems.

Results: Time1 EF (r=.35, p=.006), but not SF (r=.10, p=.461) was correlated with Time2 externalizing problems (Table 1). A regression revealed that EF (β=1.35, p<.001) and SF (β=.74, p=.010) significantly predicted later externalizing problems, with autism symptoms making marginal contributions (β=2.41, p=.055; Table 1). There was also an interaction between EF and autism symptoms (β=2.10, p=.003) such that the effect of EF on externalizing problems decreased as autism symptoms increased (Figure 1). The interaction between SF and autism symptoms was not significant (p=.355).

Conclusions: Executive function and social adaptive functioning at age 3 predict externalizing problems at age 5, particularly in children with lower levels of autism symptoms. Executive functioning presents as a potential target for early intervention in the preschool years, during which EF undergoes significant development. Given the interaction between EF and autism symptoms, it may be beneficial to specifically target children with fewer autism symptoms and more EF impairments for early EF interventions aimed at preventing the emergence of externalizing behaviors. Future studies will more closely examine the complex role social adaptive functioning may play in the emergence of externalizing problems in children with neurodevelopmental disorders.

418.372 (Poster) Effect of the Cueing Face Race on Gaze Cueing in Individuals with High and Low Autistic Traits

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Background: Observing the direction of gaze of another person leads to shifting of attention in the same direction (gaze-cueing effect – GCE), a social-cognitive ability known as joint attention. Racial attitudes can influence the magnitude of GCE since it has been shown that white people showing a strong race ingroup preference shift attention in the direction of gaze of White, but not Black, faces. Individuals with high autistic traits have difficulties in social-cognitive abilities that can disrupt the learning of socially shared racial attitudes and have been reported to have reduced attention to social cues. However, it has not been previously studied whether the level of autistic traits exerts an effect on the implicit race attitude, and if, in turn, it affects joint attention, two important aspects for social cognition.

Objectives: In an exploratory research we aimed to test in White Italian adults whether individuals with high autistic traits (measured by the Autism spectrum Quotient) show reduced implicit racial bias (measured by the Implicit Association Test – IAT) and if this bias would lead to differences in the GCE triggered by the direction of gaze of faces of different races (White and Black faces).

Methods: In an online study, participants (N=165 White Italian adults; 132 females; Mean age = 22.9; SD = 4.76) filled in the Autism-Spectrum Quotient questionnaire to quantify the level of autistic traits, then they were asked to perform a Gaze Cueing Task in order to estimate the magnitude of the gaze-cueing effect, followed by an Implicit Association Test measuring the implicit race attitude towards Black and White people of our sample.

Results: Data analysis showed that participants with high and low-medium autistic traits had the same ingroup bias. Specifically, a more positive implicit attitude toward White people (i.e., their ingroup) than toward Black people (i.e., their outgroup) was found. The size of the race bias did not differ between the two groups. Interestingly, although a significant GCE (i.e., faster RT to respond to a target when it appeared in the direction indicated by the gaze) was always found for low-medium autistic traits participants, this was not the case for females with high autistic traits, who showed a significant GCE only for the White cueing faces. Moreover, it was found that, with Black cueing faces, when the AQ score increased the GCE decreased or was absent.

Conclusions: Individuals with both high and medium-low autistic traits show an implicit preference towards their ingroup and the same implicit negative attitude toward outgroup people. However, this negative attitude seems to affect the joint orienting of attention only of females with high autistic traits, suggesting a modulation of sex and the level of autistic traits on gaze cueing. We propose that, although
females with high autistic traits retain the ability to orient to gaze direction, they may have a more limited capacity of orienting attention to social cue and, for this reason, they restrict their orienting by prioritizing joint attention with ingroup members.

418.373 (Poster) Emotion Recognition in Autism and Specific Learning Disorders: Which Is the Role of Social Anxiety and Executive Functioning?
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Background: Emotion recognition’s impairments in Autism (ASD) without intellectual disability are well-documented (Ulijarevis & Hamilton, 2013), instead less has been done with Specific Learning Disorders (SLD), though social difficulties are widespread in children who meet academic challenges (Operto et al., 2020). Moreover, some studies have demonstrated the associations between emotion recognition, executive functions, and social anxiety (Oerlemans et al., 2013; Woolard et al., 2021). To the best of our knowledge, no previous studies have focused on the above-mentioned relations by considering both ASD and SLD.

Objectives: The aims of the present study were to explore emotion recognition abilities in children and adolescents with ASD and SLD as compared to non-diagnosed participants (ND), and the possible role of social anxiety and executive functions in predicting emotion recognition.

Methods: The study involved 263 children and adolescents aged between 8 and 16 years old divided into three groups: 60 ASD (46 M), 63 SLD (44 M), and 140 matched ND participants (105 M). Children’s emotion recognition ability and executive functions (inhibition, updating, and set-shifting) were assessed by using computerized tasks, whereas social anxiety was evaluated through a questionnaire administered to parents.

Results: Univariate ANOVAs were performed to estimate differences between groups. Regression models were developed to assess the effects of the variables of interest (group, social anxiety, inhibition, updating and set-shifting) on the dependent variable (emotion recognition). Parents of children and adolescents with ASD and SLD reported greater levels of social anxiety as compared to the ND group, F(2, 260)=15.43, p<.001, Cohen’s d=63-.76. As regards the executive functions’ tasks, participants with ASD made more errors in the inhibition task compared to ND, F(2, 260)=6.78, p=.001, Cohen’s d=.72. Moreover, the ASD group performed significantly worse (~63%) than the ND (~73%) and SLD (~71%) groups in the updating task, F(2, 260)=7.56, p<.001, Cohen’s d=.61-.41. Regressions’ analysis revealed two statistically significant interaction effects. The interaction between group and social anxiety was found to significantly predict the performance on the emotion recognition task (AIC=1861.59, R^2 adj=.23; F=3.11, p=.04). Also the interaction between group and updating was found to be statistically significant (AIC=1861.35, R^2 adj=.23; F=3.22, p=.04), with ASD showing a stronger relation between updating capacity and emotion recognition.

Conclusions: Greater scores on the emotion recognition task are consistent with higher levels of social anxiety in ASD, whereas lower scores on the emotion recognition task are related to higher levels of social anxiety in SLD. Thus, better emotion recognition skills might trigger social anxiety in ASD due to a different social style leading to erroneous interpretations of others’ feedback. Instead, children with SLD might experience higher arousal when they do not understand others’ emotions, showing greater sensitivity to social consent. Finally, better updating capacity has found to relate to better emotion recognition abilities in all groups, but with a steeper slope in ASD, as if updating might support social cognition, especially in ASD. Clinical implications will focus on the need for considering both affective and cognitive aspects during treatments addressing socio-emotional skills in children with different neurodevelopmental conditions.

418.374 (Poster) Empathic Disequilibrium As a Predictor of Non-Suicidal Self-Injury in Autistic People
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Background:

Autistic people suffer from higher rates of nearly all psychiatric illnesses and are over three times more likely to engage in non-suicidal self-injury (NSSI). These behaviors are suggested to function as means of regulating numbing or overwhelming emotions. Here, we focus on the interpersonal dimension of emotions, as is fundamentally reflected in our ability to empathize: that is, in the way the emotions of others are shared and understood by us. Autistic people tend to display elevated emotional resonance with others (i.e., emotional empathy, EE) relative to their ability to understand others’ emotions (i.e., cognitive empathy, CE; Shalev et al., 2022). Such incongruency, termed empathic disequilibrium, could be hypothesised to result in individuals feeling overwhelmed by others’ emotions, such that they may resort to maladaptive emotion regulation strategies in consequence.

Objectives:

Here, we test the hypothesis that empathic disequilibrium in autistic people, characterized by higher EE than CE (i.e., EE-dominance), would be related to emotional reactivity, and through this as a mediator, to elevated risk of engaging in NSSI.
Background: Facial perception plays a crucial role in social interaction, and both are impaired in ASD. This perception can be explored by oculometric (visual exploration) and pupillometric measurements (physiological responsiveness). Visual exploration of faces is atypical in ASD, with notably a reduced time spent on the eyes. Moreover, pupil diameter variation has been shown to be reduced in ASD individuals, in particular in children when observing social dynamic stimuli. However, no study has yet evaluated how these markers evolve with age, both in the typically-developing and ASD populations, as differences between the two groups could emerge from diverging maturation processes.

Objectives: This study aimed at exploring the evolution of oculo-pupillometric parameters during face observation from childhood to adulthood in TD and ASD groups, by using stimuli along a gradient of social saliency.

Methods: One-hundred and six ASD participants (3-34 years old) were compared to one hundred and thirty-six TD participants (3-32 years old). Stimuli were organized along a gradient of social saliency, going from static objects to static neutral faces, dynamic neutral faces and dynamic emotional faces. Each stimulus lasted 4s. The global luminosity of the stimuli and the room were controlled and kept constant for each participant. No instructions were given to the participants except to pay attention to the screen and to remain silent. Pupillometric and oculometric parameters were recorded simultaneously with the FaceLab® head-free binocular eye-tracking system (60Hz).

Results: In children, the difference between the ASD and TD groups are mainly significant for the pupil diameter in response to dynamic faces. ROC analyses showed that this parameter allows for a discriminative power of about 80%, with good sensitivity and specificity. In adults, the main significant differences are observed for oculometric parameters, in particular the time spent of the faces which also reaches around 80% of discriminative power. Pupil diameter variation in response to faces decreases with age in TD population, while it seems to be rather stable in ASD population, resulting in an absence of measurable difference between adults with or without ASD. In contrary, visual exploration strategy is different between ASD and TD adults.

Conclusions: Overall, we observed that in children, pupillometric parameters are more specific and sensitive than in adults to discriminate between ASD and TD participants. On the other hand, oculometric parameters suggest that TD adults are spontaneously attracted to faces and dynamism, and that this attentional capture by social stimuli could be affected in ASD adults. This continuum study could help us understand the maturation of oculo-pupillometric parameters during face observation, in order to define appropriate discriminating biomarkers of ASD according to age.
Examining Rapport between Autistic and Non-Autistic People during Online Interactions.

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Background:
Several studies have reported that autistic people may experience greater rapport with an autistic interaction partner, compared to a non-autistic partner (Crompton et al., 2020; Morrison et al., 2020). However, current research does not yet provide a clear understanding of how or why this improved social connection is achieved. In this study, we investigated whether such benefits extend to online interactions, and whether specific features of social interactions can predict rapport in dyadic interactions.

Objectives:
1. Test whether autistic dyads achieve greater rapport than mixed-neurotype dyads in online interactions.
2. Examine the social and cognitive mechanisms which underpin interactional rapport by identifying the conversation features and movement dynamics that relate to rapport ratings.

Methods:
In this pre-registered study, 20 autistic and 20 non-autistic participants engaged in a series of online, one-to-one conversations. Half of the conversations were with a same-neurotype partner and half were with a different-neurotype partner. During each interaction, participants were given a different topic to discuss for three minutes. Participants rated the rapport they felt with their partner at the end of each interaction. All interactions were audio-video recorded for later coding. Audio data was extracted and analysed using Pyannote-audio to quantify conversation characteristics (turn-taking, length of pauses, balance of conversation). Video data was analysed using OpenFace to quantify emotional synchrony and movement synchrony within each dyad.

Results:
Initial analyses indicated that autistic participants rated their rapport similarly across different neurotype partners. Notably, they did not report improved rapport with an autistic partner in these online conversations. Non-autistic participants also rated their experienced rapport with autistic and non-autistic partners similarly. These findings are contrary to previous work with in-person interactions, and results are suggestive that mixed-neurotype interactions may be more successful in the online sphere. Follow-up work is underway to explore how features of the conversations and synchrony measures might predict rapport.

Conclusions:
It seems that rapport between autistic and non-autistic people may be appraised differently when they result from online, rather than in-person interactions. Indeed, online interactions may provide a ‘level playing field’ which minimises the bidirectional disconnect experienced between autistic and non-autistic people. Differences in the sensory demands and social etiquette for online interactions will be discussed.

Examining Sex Differences in Co-Occurring Symptoms of Autism

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Background: There is a well-established male bias in autism spectrum disorder (ASD) prevalence, with a ratio of approximately 4:1 diagnosed males to females. Existing research regarding sex differences suggests that co-occurring symptoms of ASD may differ between males and females. Specifically, previous literature has found that males with ASD may present with more externalizing behavior problems and females with ASD may present with greater internalizing symptoms, in particular with regards to severity of anxiety and depression. However, the majority of previous studies have utilized small, non-representative samples. Thus, it is important to further characterize sex differences using large, well-characterized cohorts with broad age, IQ, and symptom severity distribution.

Objectives: The primary objective was to characterize sex differences in internalizing and externalizing problems in one of the largest representative cohorts of children with ASD.

Methods: The Child Behavior Checklist (CBCL) was collected from 9,465 individuals with ASD who participated in the Simons Powering Autism Research (SPARK) study, a nationwide research project collecting medical and genetic information from families with children diagnosed with autism. The domains that were examined included broad externalizing and internalizing problems, as well as more specific
Background: Many interventions for young children with autism focus on increasing social attention (i.e., NDBI and other early interventions). Assessment of improvement for this outcome largely involves parent report (rating scales) and clinician-scored behavioral observation from video recordings (e.g., joint engagement [JE] coding from parent child interactions). Respectively, these methodologies can be subjective, and labor intensive to score. Use of eye-tracking to assess treatment outcomes may have the potential to address these drawbacks while being sensitive to incremental changes from low intensity intervention models.

Objectives: This study investigates one aspect of validity for using eye-tracking as a treatment outcome measure for this purpose by comparing its performance to behaviorally coded joint engagement from parent child interactions.

Methods: This study includes data from 39 participants ages 15 months to 5.5 years. Thirteen children with ASD were recruited. Two control groups were recruited: chronologically age matched typically developing children and receptive language matched children (using the Preschool Language Scales, 5th edition). Eye-tracking video stimuli consisted of four video clips (between 25 and 35 seconds each). Actors included an adult and a young child engaging in interactions that included joint attention presses (pointing) to toys around the room (e.g., children and adults searching for and finding additional toys to their toy set located in the visual scene). Attention to faces (duration and number of fixations) and attention to socially referenced toys (duration and number of fixations) were coded as areas of interest.

Correlations among four eye tracking measures and two behavioral measures (video coded parent child joint engagement and PEDI-CAT social cognition) were examined in a combined group of children with and without ASD. Correlations between eye tracking variables and autism severity (scores on the Childhood Autism Rating Scales, 2nd edition; CARS-2) were also examined in the ASD group only. Group differences between children with ASD and typically developing children were assessed.

Results: Moderate and statistically significant correlations were found between behaviorally coded joint engagement during a parent-child interaction and two of four measured eye tracking variables. Best performing eye tracking variables were those that included not only attention to faces, but also attention to socially referenced toys (number of fixations and JE=r=.388, p=.015; total duration of fixations and JE=r=.397, p=.01). Correlations were strongest in children with ASD and less clear in typically developing peers (both age and receptive language matched). A strong and statistically significant negative correlation was also found between eye-tracked social attention and ASD symptoms severity using the Childhood Autism Rating Scale, 2nd edition (CARS-2) (e.g., CARS-2 and duration of fixations to social stimuli=r=-.849, p<.001). Group differences on eye tracked measures of social attention were less significant than expected.

Conclusions: Eye tracking measures of social attention related to “real life” social interactions with parents, indicating some external validity, particularly for young children with autism. As such, eye tracked measures of social attention may be most useful for measuring treatment progress in preverbal and minimally verbal children with ASD. This finding aligns well with the target population for NDBI-based interventions.

**418.378** *(Poster)* Examining Validity of Eye-Tracking for Outcome Measurement in Social Communication Treatment for Children with Autism

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Results: We found that males and females with ASD differed in internalizing problems (z=-8.27, p<.001), DSM-5 depressive problems (z=-7.123, p<.001), and DSM-5 anxiety problems (z=-7.21, p<.001) but not in externalizing problems (z=-0.786, p=0.432). The 2,204 females with ASD scored higher on the internalizing problems and DSM-5 depressive and anxiety domains compared to 7,261 males with ASD (Figure 1). A parallel set of analyses using T-scores yielding an identical pattern of findings with similar effect sizes.

Conclusions: Our results indicate that sex differences in co-occurring symptoms of ASD were only found for the internalizing problems domain, including DSM-5 depressive and anxiety problems, which is consistent with the sex-trends in non-autistic samples. Females with ASD showed higher scores on the internalizing domain, consistent with previous research. However, males and females with ASD exhibited similar externalizing problems, differing from previous literature suggesting that males experience greater externalizing symptoms than females. These findings can help inform clinical care by identifying that internalizing symptoms may present differently between males and females with ASD.

**418.379** *(Poster)* Examining the Impact of Alexithymia and Autism Traits on Emotion Recognition Skills Among Children on the Autism Spectrum and Typically Developing Children

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Background: Autism Spectrum Disorder (ASD) is characterized by difficulties with social interaction and communication, and a restricted range of activities and interests. It represents the upper extreme of a constellation of social deficits that may be continuously distributed in general population. However, very little is known about the continuum of autistic traits in children under 4 years of age. Understanding early phenotypes of social difficulties that contribute to the identification of ASD is crucial for advancing early risk assessment and targeted intervention. Hence, development and validation of tools for assessing autistic symptoms/traits in preschool children is important.

Objectives: To examine the measurement properties of the preschool version of Social Responsiveness Scale (SRS).

Methods: In our study, we examined the measurement properties of the preschool version of Social Responsiveness Scale (SRS) in a community ascertained sample of preschool children (N = 815, aged 2.5-5.5 years). We used Confirmatory Factor Analysis to test the fit of the 2-factor model: Social Communication Index (SCI) and Restricted and Repetitive Behavior (RRBs); and the 5-factor treatment subscales model: social awareness, social cognition, social communication, social motivation, and autistic mannerisms. Tests of goodness-of-fit of the models were evaluated using multiple criteria described by Hu and Bentler (1999); Comparative Fit index (CFI) ≥ 0.9, Tucker-Lewis index (TLI) ≥ 0.9, root-mean-square error of approximation (RMSEA) < .06, standardized root mean square residual (SRMR) < .08. Chi-square tests are almost always significant in large sample sizes- indicating a poor fit.

Results: Confirmatory Factor Analyses indicated poor fit for the 2-factor structure (SCI and RRB) (χ2 (2005) = 6589.69, p < 0.001 , CFI = 0.581 , TLI = 0.565 , RMSEA = 0.053, SRMR = 0.065).

Conclusions: These findings were inconsistent with the alexithymia hypothesis as higher autism and alexithymia traits were associated with increased ER accuracy from music. As such, these findings extend the evidence of enhanced recognition of musical ER among persons on the AS to include those with co-occurring alexithymia, and provide additional support for the utility and accessibility of music education and therapies in promoting social emotional communication, not only among persons on the AS, but also among persons with alexithymia.
Conclusions:

While SRS is a widely used and validated tool to assess autistic traits, our study showed a poor fit for measuring the underlying factor structure of the preschool SRS. Previous work by Duku et al. (2013) that examined the measurement properties of preschool SRS in an ASD sample had also shown poor model fits. As the SRS was developed to quantify the population distribution of autistic traits, both our work and Duku et al (2013) might be limited due to our segregated samples. Continuing work will incorporate data from preschool children with an ASD diagnosis to test for the psychometric integrity of the preschool SRS.

418.381 (Poster) Explicit and Implicit Intention Readout in Children with Autism Spectrum Disorders

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Background:

The ability to extract information is key to social interaction (Becchio et al., 2018). Previous research has shown that a sizeable proportion of individuals with autism spectrum disorders (ASD) are able to extract intention information from viewing the actions of others (Montobbio et al., 2022). This was demonstrated using a forced-choice format, in which observers were instructed to decide between alternative intentions. However, it remains unclear whether ASD observers exploit intention-related information when they are not explicitly instructed to attend to action intention. Here, we tested this hypothesis by comparing the spontaneous use of intention-related information to process others’ actions in typically developing (TD) and children with ASD.

Objectives:

1. Examine whether TD and ASD children are able to use intention information in an explicit intention discrimination task
2. Examine whether TD and ASD spontaneously use intention-related information to process others’ actions in an implicit primed action categorization task

Methods:

Twenty children with ASD (mean age: 10.75, 4 females) and twenty TD children (mean age: 10.7, 5 females) were tested, following local ethic committee approval. Participants completed a primed action categorization task, followed by an intention discrimination task. In the primed action categorization task, participants observed either a reach-to-drink or reach-to-pour act (prime) followed by a picture of an agent drinking or pouring (probe). The prime-probe relationship was either congruent (same intention; 75% of trials) or incongruent (different intention; 25% of trials) and varied from trial-to-trial. Participants were asked to verbally categorize the action displayed in the static probe image as fast as possible whilst remaining accurate. One hour later, participant completed a forced-choice intention discrimination task in which they were explicitly instructed to discriminate between reach-to-drink or reach-to-pour acts.

Results:

Mixed effects statistics were applied to analyze accuracy and response times. While performance in the intention discrimination task was more variable across ASD children, both ASD and TD children proved capable of explicitly discriminating the intentions of observed actions (p<0.001).

Both ASD and TD children also displayed a kinematic priming effect, that is a facilitation effect in the congruent compared to incongruent condition (p<0.001) in the primed action categorization task. ASD children were overall slower than controls in responding across all implicit conditions (p<0.001).

Conclusions:

Our findings indicate that both TD and ASD children are capable of extracting intention information from observing others’ movements and implicitly exploiting this information to process the actions of others.

418.382 (Poster) Mental Health and Belonging: Participation in Inclusive, Interest-Based, Afterschool Maker Clubs for Middle School Autistic Students

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Background:

There is an increasing amount of research concerning mental health conditions that co-occur with autism, interventions for these conditions, and the desire for access to mental health services by autistic individuals (Cleary et al., 2022; Lai et al., 2019; Cage et al., 2017). While it has been established that autistic individuals are at risk of mental health conditions, studies have found that protective factors like the sense of belonging, social connectedness, and social support improve the mental health and well-being of autistic individuals (Botha et al., 2022; Cooper et al., 2017; Hedly et al., 2018).

Shochet et al (2016) proposed a conceptual model using school-based interventions to promote the mental health and well-being of autistic adolescents. Participatory research within the autistic community found that autistic individuals prefer autistic-led interventions (Benevides et al., 2020) and view their interests positively contributing to social connection (Patten Koenig & Hough, 2017). According to Chen et al. (2021), interactions between autistic students in an inclusive Maker club were mainly characterized by shared thoughts and experiences rather than functional purposes.

Objectives: This study intends to understand middle school autistic students’ experiences participating in an inclusive interest-based Maker program and their perceived impact on the sense of belonging, social connectedness, and self-determination.

Methods:

We conducted a qualitative thematic analysis of data collected from the Maker’s program, an inclusive interest-based extracurricular program designed to incorporate students’ interests in science, technology, engineering, and mathematics (STEM) learning. Data was collected from three public middle schools in a large urban area over two academic years.

We examined transcripts of 8 focus groups (two midpoint focus groups and six focus groups at the end of the school year) with teachers who led the program; 4 focus groups with students who participated in the program; 4 parent interviews; and field observation notes (n=149).

Results:

Preliminary thematic data analysis revealed the following themes. 1) Building friendships with other autistic students: students interacted by helping each other with their projects and club activities, sharing workspaces, co-regulating themselves and their peers, offering physical and emotional support, and developing an organic relationship with each other. 2) Finding identity and pride in making: students expressed satisfaction and received social admiration for their projects; they developed a sense of competency. Teachers and parents described increased positive affect and engagement among students in the project, 3) Agency in designing projects: students could choose, plan and develop projects that stemmed from their interests by expressing curiosity in STEM concepts and practices, asking questions, and problem-solving 4) The MAKER club as a safe space: we found that some students exhibited more positive behaviors like collaboration, social interaction, self-expression when they were in the club space compared to other environments.

Conclusions:

Key to addressing the risk of mental health conditions among autistic individuals is promoting protective factors like sense of belonging, social connectedness, and self-determination. Autistic children who engage in interest-based activities with their peers in an inclusive environment experience improved mental health and well-being.

418.383 (Poster) Exploring the Relationship between Empathy and Social Skills for Individuals with Different Forms of Intellectual and Developmental Disabilities

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Background: Empathy (i.e., the ability to understand and respond to the emotional state of others) is one area of concern for individuals with IDD (de Wied et al., 2007). While lower levels of empathy are consistently reported for individuals with IDD, these skills may vary across specific IDD groups such as autism spectrum disorder (ASD), Williams syndrome (WS), and Down syndrome (DS). Specific social skills may also be crucial to understanding and expressing empathy towards others (Josol et al., 2022; Koegel et al., 2016; Hill, 2009). Given the relationship between empathy and social skills in the general population, it is critical to examine the same relationship for various IDD groups to inform current and future interventions.
Objectives: The current study was conducted to examine the specific relationship of empathy and social skills for individuals with ASD, WS, and DS as well as to assess for any differences across groups (including a typically developing [TD] control group).

Methods: The final total sample (N = 120; mean age = 11.30 years) included 30 child/caregiver pairs for each group condition. Caregivers completed the children’s version of the Empathy quotient (EQ-C; Auyeung et al., 2009). To measure social skills, caregivers completed the Social Responsiveness Scale-Second Edition (SRS-2; Constantino & Gruber, 2005). A one-way ANOVA was conducted to determine if mean scores on the EQ-C and SRS-2 subscales differed across groups. A multiple-group path analysis (Muthén & Muthén, 2012) was conducted to assess the relationship between empathy and social skills across groups.

Results: The one-way ANOVA was statistically significant (F (3, 116) = 22.87, p < .001) with a large effect size (η² = .372), suggesting that about 37% of the variance of mean scores on the EQ-C was due to differences in group condition. Mean scores on the EQ-C for the ASD group were significantly lower compared to the other groups. Results of the multi-group path analysis indicated significant differences in the relationship between empathy skills and social skills across groups. Most notably, the WS group differed significantly from the other groups on performance on the EQ-C in relation to the social awareness subscale of the SRS-2 (M = -0.33, p < .001) but did not differ with the social motivation subscale (M = 0.21, p = 0.13) of the SRS-2.

Conclusions: The results of this study indicate that empathy and social skills differ between individuals with ASD, WS, and DS. Compared to those with WS and DS, as well as to those without disabilities, individuals with ASD exhibit poor empathy skills. This finding highlights that empathy might be a critical intervention target for individuals with ASD but might not be as important for individuals with WS or DS. Second, individuals with WS differed significantly in their relationship between empathy skills and social awareness (i.e., one’s ability to recognize social cues) compared to other groups. This finding highlights a potential area for intervention for individuals with WS. Overall, the results of this study highlight the importance of considering etiology for current and future interventions.

418.384 (Poster) Exploring the Relationship between Self-Regulation and Empathy in Individuals with ASD

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Background: Empathy is important in shaping developmental trajectories of daily interactions between children. When children exhibit appropriate responses to others in distress, this plays a positive role in their social functioning and helping behaviors. Individuals with autism spectrum disorder (ASD), however, face challenges with the ability to discriminate between various emotional states and how to respond (Conner et al., 2018; Mazefsky & White, 2014). Self-regulation skills are a prerequisite to empathizing with others (Eisenberg et al., 2009; Spinrad & Eisenberg, 2017). Previous evidence, however, is scarce in supporting the connection of levels of empathy and levels of self-regulation skills throughout autism research (Kasari et al., 2003). Examined through personality constructs, conscientiousness and agreeableness are meta-traits that emerge from self-regulation (McAdams, 2015). Conscientiousness is the inhibition of specific behaviors to accomplish goals and to direct attention to tasks (Jensen-Campbell et al., 2007; Rothbart et al., 1994). Agreeableness is the ability to interpret interpersonal cues, engage in social responses, and to empathize with others (Schriber et al., 2014).

Objectives: The present study examined the relationship between self-regulation and empathy in children (ages 7-13 years) with autism. The central hypothesis of this study is that levels of self-regulation skills will be positively associated with levels of empathy in school-age children.

Methods: Children with confirmed diagnoses of ASD and anxiety disorder (N = 195; 7-13 years, M=9.98) participated in this study. The measures utilized in this study were the Empathic Reaction Task (ERT) and the Hierarchical Personality Inventory for Children (HiPIC) questionnaire. The ERT measured a participant’s levels of empathy through a set of emotional video vignettes and related questions (Feshbach & Feshbach, 1987; Wood et al., 2019), while the HiPIC questionnaire measured self-regulation through personality domains of conscientiousness (α=.885) and agreeableness (α=.76).

Results: Findings revealed that there was a positive association between self-regulation and empathy supporting the hypothesis of the study. Results highlighted a significant positive association between emotional (i.e., affective) isomorphy within the ERT and both personality traits: conscientiousness (r=.184; p=.05) and agreeableness (r=.268; p<.01). Isomorphy captures the synonymous feeling to another person’s emotional state, therefore, participants may have imitated behaviors and emotions by observing the protagonist each video vignette (Bandura, 1977). As the development of empathy stems from the imitation of facial expressions and the simulation of others’ experiences, participants may have mirrored the protagonists’ emotions in the video vignettes (McDonald & Messinger, 2011; Schipper & Petermann, 2013).

Conclusions: Greater self-regulation may support fundamental mental processes underlying empathy in children with autism. This work may inform future studies on the impact of self-regulation in children with autism as they reach school age. Further analysis will identify subgroups of participants, which in turn, could lead to more effective individualized treatment for individuals with autism, thus combining the fields of personality, socio-emotional learning, and clinical research in autism.

418.385 (Poster) Eye-Tracking and Intent Attribution in Bullying Situations

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Background: Bullying in the classroom is a challenging issue for educators and parents. Understanding the social dynamics of bullying is essential for creating effective interventions. The current study aimed to explore the role of eye-tracking and intent attribution in bullying situations.

Methods: Participants were 60 middle school students (30 victims and 30 perpetrators) who were recruited from a local school district. Participants were divided into two groups based on their role in bullying situations. The intention to bully was measured using a questionnaire. Eye-tracking data was collected while participants watched a video of a bullying scenario.

Results: The eye-tracking data indicated that victims and perpetrators had different patterns of eye movement. Victims were more likely to fixate on the perpetrator’s face, while perpetrators were more likely to fixate on the victim’s face. This suggests that victims are more aware of the perpetrator’s intentions, while perpetrators are more focused on the victim. Intent attribution was measured using a scenario where participants had to decide whether a peer was trying to help or harm them. Participants in both groups were more likely to attribute harm to the peer, indicating a higher level of suspicion in bullying situations.

Conclusions: The findings support the hypothesis that bullying situations involve complex social dynamics that can be identified through eye-tracking and intent attribution. Understanding these dynamics can inform the development of targeted interventions to prevent bullying.
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Background:
Autism is marked by social communication issues, and differences in visual attention have been identified as a key mechanism involved in observed social difficulties. Children with autism experience higher rates of bullying victimization than neuro-typically developing (TD) children and children with cognitive impairments (Rowley et al., 2012). Children with autism often do not attend to pertinent areas when viewing social interactions (Jones & Klin, 2013), and therefore may not obtain crucial information for social learning. Over the course of development, this leads to compounding difficulty in acquiring and learning from social situations. Tools such as eye tracking can be used to provide a window into these visual patterns and their connection with social difficulties.

Objectives:
We seek to establish a link in the early steps of social information processing, namely the encoding of cues (i.e., using an eye tracker to determine what a child focuses on) and understanding the intent of the offender. The link between what the child attends to and social-cognitive processes may help us understand the nuanced difficulties in complex social behaviour.

Methods:
Twenty-four high functioning children with autism (i.e., IQ > 85) and 24 neuro-typically developing children watched social scenes that contained instances of clear, ambiguous, or likely bullying (i.e., the intent of the offender varied in the scenes), using eye-tracking to monitor their gaze patterns. Areas of interest were created to identify the parts of the scene that provided the most social information. The children were then asked to identify the intent of the offender and were given prompts to provide complete answers.

Results:
There were differences between the autism group and the TD group on key areas in each of the scenes. Children with autism often did not follow eye gaze of others as much as TD children when presented with ambiguous stimuli (p = 0.007) and did not look at people’s faces as often (p = 0.011) and spent more time looking at areas that had no social information (p = 0.043). In addition, across the groups overall looking time predicted insight into the intent of the offender for the ambiguous stimuli, time looking at faces predicted insight in the scenes with likely bullying, and time spent looking at the hostile act predicted insight in the clear bullying situations.

Conclusions:
The results of this study show the importance of proper visual attention in understanding intention. There are clear differences between children with autism and TD peers in attention to important areas for understanding social nuance. If different social cues are being attended to, then pathways linking visual attention to interpreting social interactions will be affected leading to difficulties in understanding, including attention to faces, and social cue-directed attention. Implications of the pathways are discussed, as well as implications for treatment.

418.386 (Poster) First Impressions and Gender Expression: Evidence of a Double Penalty for Autistic Women

Background: Recent evidence suggests that there is a higher rate of gender-diverse expressions among autistic individuals than among neurotypical (NT) populations (Brunissen et al., 2020). Additionally, social first impressions of autistic individuals are generally rated less favorably than first impressions of neurotypical individuals (Cola et al., 2020), even for very brief exposures (Grossman, 2015; Sasson et al. 2017). However, there are no studies on how perceived gender expression influences the first impressions of autistic individuals and their non-autistic peers. This relationship between perceived gender expression and first impressions of autistic individuals may have significant impact on day-to-day social interactions and integration, warranting further exploration.

Objectives: The purpose of this study was to investigate the relationship between first impressions of social behaviors and perceived gender expression autistic and NT youth.
Methods: Non-autistic adult raters (N=119) were shown sixty 7-10 second video clips of a naturalistic conversational exchange between autistic and NT youth and a novel young adult. Youth consisted of 15 NT females, 15 NT males, 15 autistic females, 15 autistic males; groups were matched on age and full-scale IQ. Autistic females and males were also matched on ADOS-2 calibrated severity scores. Raters provided first impressions scores of the social behaviors of each youth via five questions (e.g., “does this person have a lot of friends?” or “how well do you think this person gets along with others?”), as well as their perceived gender expression (i.e., femininity, masculinity, and others/neither) via non-graduated slider bars.

Results: Autistic females were rated as significantly less feminine, more masculine and more other/neither than their neurotypical peers. In contrast, there were no significant differences in the perceived gender expressions of autistic males and NT males. Raters provided significantly more positive ratings for NT females than autistic females across all six social impression questions. NT males were rated more favorably than their autistic male peers on four of the six social impression questions. Femininity ratings of individuals in the videos were positively correlated with social impression scores of autistic females for five out of six questions and positively correlated with social impression scores of NT females for all six questions. Masculinity ratings were positively correlated with social impression scores of autistic and NT males for four out of six questions.

Conclusions: Findings suggest that perceived gender expression is related to social impressions of autistic and neurotypical youth and has a particularly strong impact on how autistic females are perceived by others. Raters reported more positive social impressions for youth whose perceived gender expression matched their assigned sex at birth. We found that autistic females were perceived as significantly less feminine, and less socially skilled than both their female NT peers and autistic males. These data indicate a potential first impression double penalty for being autistic and female, which has important implications for the social integration of autistic females or autistic individuals whose perceived gender expression may differ from cis-normative social expectations.

418.387  (Poster) Frank Autism in Adolescents and Adults Who Have Lost the Autism Diagnosis: Impressions during the First Five Minutes of an Interaction


Background:

“Frank autism,” recognizable through the first minutes of an interaction, describes a behavioral presentation of autistic individuals that is closely tied to social communication challenges and other symptoms (de Marchena & Miller, 2016). Specific contributing factors have only been studied anecdotally, and to date there is no research on frank autism presentations of individuals diagnosed with autism in childhood who do not meet diagnostic criteria after adolescence (loss of autism diagnosis, LAD; Fein et al., 2013; Eigsti et. al. 2022). LAD individuals have cognitive, language, and social standardized assessment scores within the average range, but could exhibit subclinical difficulties within the context of increasing demands of adulthood.

Objectives:

This study quantifies initial impressions of autistic characteristics in individuals with current autism (ASD; n=25, m\text{age}=21.2, 18 male, 7 female), LAD (n=23, m\text{age}=22.9, 18 male, 5 female), and neurotypical (NT; n=26, m\text{age}=22.1, 11 male, 15 female) histories. In addition to extending Wieckowski et. al., 2021, which compared five-minute impressions with gold-standard diagnostic measures, into adolescence and adulthood, we evaluated initial impressions of LAD individuals.

Methods:

Graduate clinicians completed a Five-Minute Impressions form (Thomas et al., 2021) during a recorded ADOS-2 module 4 administration (Eigsti et al., 2022). Items probing gestures, eye contact, motor mannerisms, prosody, facial expressions, attentional focus (including perseverations and distractibility), social responses, and social initiations, were scored 0-2 (0: expected behavior; 2: obviously atypical behavior). Items were summed for an Overall Impressions score.

Results:

Groups all differed on Impression scores; Table 1. Compared to the ASD group, the LAD group had a less frankly autistic impression score overall (1.6 versus 5.8), and on eye contact, prosody, facial expressions, and social responses. Compared to the NT group, the LAD group had a significantly higher overall impression score (1.6 versus 0.5), but did not differ on individual items. There was a significant interaction between impression status and diagnostic status, c²=58.37**, suggesting that clinically significant autistic characteristics observed during the first five minutes were consistent with diagnostic outcomes. Similarly, impression scores and ADOS-2 total scores were correlated (Figure 1).

Conclusions:
We compared initial impressions of frankly autistic characteristics in LAD, ASD, and NT groups, and probed the behaviors associated with these frank autism impressions. We extended prior findings of a strong relationship between 5-minute impression and final diagnostic classifications into an older age-group. Findings indicated that the LAD group looked more typical than the ASD group overall and in four of eight specific behaviors (all behaviors which also differed in the ASD/NT contrast). In contrast, the LAD group’s overall impression scores were higher than their NT peers, but the difference was of small magnitude, with no specific behavioral differences. This suggests a mild residual ASD presentation in LAD, though differences between LAD and ASD were much more apparent. Findings suggest that autistic characteristics in adolescents and adults are apparent to clinical experts within the first five minutes, and may suggest the presence of subtle autistic characteristics in individuals who no longer meet criteria for the diagnosis.

**418.388 (Poster) Friendships and Social Interactions for Autistic Adolescents**

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**Background:**

Autistic adolescents often report social interactions as challenging (Locke et al, 2010), particularly with neurotypical peers (Sedgewick et al, 2019, Carrington et al, 2003). Much research has centred around interacting with strangers, however recent research has also highlighted challenges with initiating and maintaining friendships (Cresswell et al, 2019). For example, it is known that autistic adolescent girls in cross-neurotype friendships finding navigating relational aggression more difficult relative to neurotypical girls (Sedgewick et al, 2019). Some challenges may stem from behavioural differences, for example eye contact appears less important for creating first impression judgements for autistic-autistic dyads but does influence judgements by neurotypical peers (Crompton et al, 2020, Rifai et al, 2022, Davis and Crompton, 2021). However, no research to date has brought all three components of social interaction quality, friendships, and eye contact together in an interview study intended to gain the direct of autistic adolescents on their social world across contexts and social partners.

**Objectives:**

To explore autistic adolescents’ perspectives on their social interactions, friendships, and eye contact and links between these areas.

**Methods:**

15 autistic adolescents (mean age: 14.9 years) were interviewed online via Microsoft Teams using an interview schedule co-produced with two autistic adolescents and two autistic adults.

Data were analysed using Reflexive Thematic Analysis (Braun & Clarke, 2021), intended to expand existing theories of autistic social interactions based upon the direct perspectives of autistic adolescents.

**Results:**

Six core themes were constructed from the data. Autistic participants discussed how the onus was frequently placed on them in social interactions despite social interactions being inherently dyadic. This is relevant given that stigma-based training for neurotypicals is becoming increasingly available (Gillespie-Lynch et al, 2015, Ranson & Byrne, 2014). Similarly, participants discussed navigating neurotypical social rules, but also uncertainty regarding when these rules can be broken. For friendship themes, trust, certainty, and a sense of shared understanding were highlighted as essential. Of particular interest is the finding that whilst shared neurotype was found to be facilitative for friendships (Crompton et al, 2020), some autistic adolescents highlighted that a shared neurotype alone was neither necessary nor sufficient for their friendships. This supports the notion of double empathy (Milton, 2012) but expands it by noting that the nature of neurotype interactions may substantially depend on context and social partner. Likewise, the importance of shared interests is consistent with the theory of monotropism (Murray et al, 2005). Eye contact themes centred on the importance of context (Chevallier et al, 2015). Participants also highlighted eye contact as one potential social strategy amongst many for successful social interactions.

**Conclusions:**

By asking autistic adolescents directly about distinct aspects of social interactions (e.g. general social interactions, friendships, and eye contact) the perspectives of autistic adolescents can inform and expand existing theories. This has key implications for further expanding theories such as those centred around Social Motivation (Chevallier et al, 2012), Double Empathy (Milton, 2012), and monotropism (Murray et al, 2005).

**418.389 (Poster) Gender Differences in the Relation between Autism Symptom Severity and Emotion Regulation**
**Background:**

Previous research indicates several gender differences in the presentation of autism spectrum disorder (ASD), as well as difficulties with executive functions including emotion regulation (Head et al., 2014; Wieckowski et al., 2020). Research suggests that children on the autism spectrum are more likely to experience emotion dysregulation (Mills et al., 2022). Although autism symptom severity is associated with emotion dysregulation, very little research has explored gender differences in this relationship (Fenning et al., 2018). Given the significance of emotion regulation and autism symptom severity in determining a child’s prognosis, it is important to examine any additional contributing factors to child outcomes.

**Objectives:**

This study sought to examine potential gender differences in the presentation of ASD and emotion regulation in school-aged children. Specifically, we investigated whether the relation between autism symptom severity and emotion regulation varied based on gender.

**Methods:**

This study utilized cross-sectional data from a larger online survey examining the relationship between executive functions and emotional and behavioral challenges often experienced by children on the autism spectrum living in the United States. Participants included 32 parents of children on the autism spectrum between the ages of 5-10 years old (M = 7.06, SD = 1.46). Children were predominantly White (63%) and male (64%). The emotional control subscale of the Behavior Rating Inventory of Executive Functions, 2nd edition (BRIEF-II) was used as a parent-report measure to assess children’s emotion regulation and a composite score using the Social, Understanding, Stereotyped and Change subscales from the Children’s Social Behavior Questionnaire (CSBQ) was used to assess autism symptom severity (Bildt et al., 2009).

**Results:**

A multiple regression analysis was conducted to predict emotional control from autism symptom severity and child gender. Results supported a statistically significant interaction effect that accounted for 28% of the variance in emotion regulation (F(3, 28) = 3.67, p = .024). Probing the interaction effect with pick-a-point approach indicated that the relation between autism symptom severity and emotion regulation is not significant for girls but is significant for boys. Parents reported a mean emotion regulation score of 65.09 (SD = 3.88) for girls and 64.19 (SD = 9.83) for boys.

**Conclusions:**

These results indicate that gender moderates the relation between autism symptom severity and emotion regulation. Specifically, autism symptom severity is predictive of emotion regulation in boys, but not in girls. Regardless of autism symptom severity, parents report similar levels of concern about girls’ emotion regulation while parents of boys express greater concern about their emotion regulation as their autism symptom severity increases. Considering the young age of this sample and potential implications of these findings, it would be important for future research to examine the influence of potential biological and social factors that may impact parents’ concerns regarding their children’s emotion regulation. Additionally, examining and addressing these concerns early may help with earlier intervention and lead to better outcomes.
Methods: In this preregistered study (AsPredicted: #41811) adults aged 30-90 years filled in among others the Dutch Camouflaging Autistic Traits Questionnaire (CAT-Q-NL), Autism Spectrum Quotient (AQ) and ADHD Self-Report (ADHD-SR). We investigated differences in camouflaging between adults with ADHD, autism, and a comparison group in an age and sex-matched subsample (N=105 per group). Also, we explored if autism and ADHD traits explained the level of camouflaging in adults with an autism and/or ADHD diagnosis (N=477).

Results: Adults with ADHD scored higher on total camouflaging and assimilation compared to the comparison group. However, adults with ADHD scored lower on total camouflaging, compensation, and assimilation than autistic adults. Also, we found that autism, but not ADHD traits, were a significant predictor of camouflaging, independent of diagnosis.

Conclusions: As expected, adults with ADHD camouflage, but not as much as autistic adults. Whether we have been able to fully capture all strategies that adults with ADHD use to camouflage needs to be determined, because the CAT-Q-NL was initially developed based on camouflaging experiences of autistic adults. Further research is necessary to understand the importance of camouflaging for adults with ADHD, including potential consequences for late diagnoses and mental health.

418.391 (Poster) Is There a Causal Effect of Camouflaging on Quality of Life? a Co-Twin Control Study

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Background:

Mental health problems and reduced quality of life (QoL) are common in autism. A proposed risk factor is camouflaging, where autistic traits are masked or compensated for. Neurotypical people also report camouflaging, discussed as impression management, albeit to a lesser extent than autistic people. First-hand accounts from autistic adults describe that camouflaging can lead to exhaustion, experiences of presenting a “false” façade, and reduced access to support. Consistently, camouflaging shows associations with perceived stress, anxiety, depression, and reduced quality of life. However, current cross-sectional evidence is not sufficient for causal inference. While previous studies warrant further investigation, study designs allowing control for potential confounding are needed to support the hypothesis that camouflaging has a negative effect on QoL.

Objectives:

The current study aims to investigate the link between camouflaging and QoL in monozygotic (MZ) and dizygotic (DZ) twins. We hypothesize a negative association both across the entire sample and when controlling for factors shared within twin-pairs (including genetics and shared environment), consistent with a causal effect of camouflaging on QoL.

Methods:

The current sample included 104 twins (15 with an autism diagnosis; 34 MZ-pairs and 18 DZ-pairs) participating in the Roots of Autism and ADHD Twin Study in Sweden (RATSS), aged from 10 to 37 years. Camouflaging was measured by self-report on the Swedish version of the Camouflaging Autistic Traits Questionnaire (CAT-Q/SE), and QoL by self-report on the EUROHIS-QOL 8-item index.

Linear regressions within the Generalized Estimating Equations (GEE) framework, accounting for the clustering of twin-pairs, were conducted to investigate the association between camouflaging and QoL across the sample. Subsequently, conditional GEE regression models were fitted to investigate the association within pairs, controlling for everything shared within twin-pairs, including ~50% of genes in DZ-pairs and 100% of genes in MZ-pairs. Unadjusted models including only the main variables were fitted first, followed by adjusted models including covariates (sex/gender, age, autism, ADHD, psychiatric conditions).

Results:

Across the sample, camouflaging was negatively associated with QoL (b = -0.14, p < .001), also in the adjusted model (b = -0.13, p < .001). In the unadjusted conditional regression within twin-pairs, the association remained in DZ-pairs (b = -0.16, p < .001), but was attenuated to a trend level effect in MZ-pairs (b = -0.07, p = .071). In the adjusted within-pair regression, the association only remained in DZ-pairs.

Conclusions:
A negative association was found between camouflaging and QoL, which remained within DZ-pairs, i.e., the twin reporting higher camouflaging generally reported lower QoL compared to their co-twin, but the association was attenuated within MZ-pairs, suggesting at least partial genetic confounding, i.e. common genetic influences accounting for the association rather than true causation. Data from additional twins will be collected during autumn 2022, increasing the precision of the analyses. A significant within-pair association in MZ-pairs would be consistent with a causal effect of camouflaging on QoL, providing important information for interventions aiming to increase QoL among autistic people.

**418.392 (Poster) Item Response Analysis of Eye-Tracking Data Reveals Effectiveness of Streamlined Assays: Results from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT)**


**Background:**
Currently there are multiple putative eye-tracking biomarkers in ASD that quantify visual social attention. Across studies, results reliably indicate that autistic individuals demonstrate reduced social attention, e.g. looking at faces, than comparison groups. However, the particular experimental stimuli and designs used are highly variable, and it is not known how these choices impact the measurement of social attention. Moreover, it has not been demonstrated that different eye-tracking batteries, or different stimuli within the same battery, are measuring the same underlying construct of social attention.

**Objectives:**
We apply an item response theory (IRT) modeling approach to eye-tracking data to address: (1) Whether social attention is a unidimensional construct; (2) Can we identify those characteristics of stimuli that predict better or worse performance of the battery to discriminate among different levels of social attention.

**Methods:**
Data were collected as part of the Autism Biomarkers Consortium for Clinical Trials (ABC-CT); a multisite, naturalistic study of 6-11 year-old children with ASD (n=280) and NT (n=118) development. Clinical characterization was thorough and included measures of cognitive ability and ASD symptomology. Eye-tracking data was collected from 106 distinct eye-tracking stimuli incorporating a mixture of static and dynamic stimuli varying in duration, image composition, and the presence of audio cues. Social attention was quantified, at the level of stimuli, as the propensity for a participant to look to faces more than would be predicted by chance. IRT analyses of stimuli employed a standard 2-parameter logistic model.

**Results:**
Preliminary analyses identified a single factor accounting for approximately 30% of the variance in social attention. Analyses of stimulus characteristics identified that stimuli with sound and/or motion better differentiated social attention among participants who looked less to faces overall (t =20.1, p <.001), whereas silent and/or static stimuli better differentiated social attention among participants who looked more to faces overall (t =5.2, p <.001). IRT derived item characteristic functions allowed us to develop a streamlined battery composed of 18 stimuli closely approximating the performance of the full 106 stimulus battery. Responses on these 18 stimuli discriminated between diagnostic groups with a very large effect size (t =10.1, p <.001, d = 1.3) and correlated with face memory performance (rho = .33, p <.001) among participants with ASD, such that increased looking to faces associated with better performance on measures of face memory.

**Conclusions:**
This is the first IRT analysis of an eye-tracking battery. We validated that social attention as measured by this battery is unidimensional. Additionally, analysis of stimulus properties suggests that increased social attention reflects endogenously driven active viewing of the social world, while in individuals who look less overall to faces, attention is more impacted by exogenous characteristics such as sound or motion. Finally, the performance of our streamlined battery shows that it may be possible to dramatically reduce participant burden in ET batteries without loss of information. Overall, these results present a step towards understanding and utilizing the psychometric properties of stimuli in eye-tracking research to better measure social attention and to optimize research designs.

**418.393 (Poster) It’s All in the Mind: The Contribution of the Precision and Distinctiveness of Visual Emotion Representations to Autistic and Non-Autistic Emotion Recognition**

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**Background:**

For several decades studies have documented that autistic individuals have difficulties with emotion recognition, however, currently it is unclear why. In a parallel literature, recent developments suggest that the way non-autistic people picture emotional expressions in their mind’s eye - that is, their imagined visual representations of expressions - influences emotion recognition: people with precise and distinct expression representations are better at reading emotions (Keating & Cook, pre-print). Here we investigate whether differences in emotion recognition in autism are linked to differences in the precision and/or distinctiveness of imagined visual representations of emotional expressions.

Objectives:

There were two primary aims: 1) compare autistic and non-autistic adults on emotion recognition accuracy, representational precision, and representation distinctiveness, and 2) determine which variables are important for autistic and non-autistic emotion recognition.

Methods:

45 autistic and 45 non-autistic participants, matched on age, sex, and non-verbal reasoning, completed two tasks employing dynamic point light displays of faces (PLFs) depicting angry, happy and sad expressions. In the first, on each trial participants were moved a dial to change the speed of a PLF until it matched the speed they typically associated with an angry, happy or sad expression. Visual representational precision was indexed as the standard deviation of the speeds attributed to the angry, happy and sad expressions respectively, multiplied by -1. Distinctiveness was captured in a distance score, calculated as the absolute difference in speed attributed to two different emotions. In the second task, on each trial, participants viewed a PLF and rated the extent to which the expression looked angry, happy and sad. Emotion recognition accuracy was calculated as the correct emotion rating minus the mean of the two incorrect emotion ratings.

Results:

A series of linear mixed effects models was employed to determine the contribution of group (ASD, CTRL), the interaction between emotion and group, age, sex, and non-verbal reasoning to emotion recognition accuracy, representational precision, and distinctiveness, respectively. Whilst there was no significant effect or interaction with group for accuracy or distinctiveness [both p > .05], there was a significant main effect of group for representational precision [F(1,85) = 4.83, p = .031]. In contrast to our hypothesis, autistic participants exhibited significantly higher representational precision than non-autistic participants. Next, to determine the relative importance of numerous variables for autistic and non-autistic emotion recognition, we conducted a random forests analysis in each group using the Boruta wrapper algorithm. For non-autistic participants, representational precision and non-verbal reasoning were classified as important for emotion recognition: non-autistic people with more precise visual representations and higher non-verbal reasoning had greater accuracy. In contrast, for autistic participants all variables were classified as unimportant for emotion recognition.

Conclusions:

Our results illuminate that different abilities are implicated in autistic and non-autistic emotion recognition. Specifically, non-verbal reasoning ability and representational precision contribute to emotion recognition accuracy for non-autistic, but not autistic, individuals. These findings align with Bayesian accounts of autism which posit that autistic people are less affected by their priors (e.g., visual emotion representations) than non-autistic people.

418.394 (Poster) Language Preferences for Describing Autism in Canada

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Background:

The language used to describe autistic people in research and everyday contexts remains a topic of debate. Research on autism often utilizes person-first language in reference to participants with an autism diagnosis. Person-first language places the person before the disability word in a phrase, such as “person with autism” (Dunn et al., 2015). Person-first language is considered stigmatizing by some autistic self-advocates, as it interprets autism through the medical model of disability, suggesting autism is “curable” (Sinclair, 2012). Autistic people and some researchers have advocated for the use of identity-first language, such as “autistic person,” as this language acknowledges that autism is something that cannot be separated from the person (Sinclair, 2012). Kenny and colleagues (2016) surveyed a large sample (n=3470) of UK residents including autistic people, family members/friends, and professionals. The term ‘autistic’ was preferred by autistic adults, family members/friends, and parents, while the term ‘person with autism’ was the preference of professionals. A similar study conducted by Buiksman and colleagues (2022) surveyed a large sample (n=1312) of Dutch autistic adults and parents of autistic children. Their results indicated that most autistic adults and parents preferred person-first language. Together these results suggest that language and culture may impact language preferences.
Objectives:

The objective of this study was to examine whether language preferences differ across a Canadian sample of autistic adults, parents of autistic children, professionals, and the broader community.

Methods:

In the current study we surveyed a large Canadian sample of autistic adults (n=97), parents of autistic children (n=112), professionals (n=115), and the broader community (n=406), to assess whether differences in language preferences exist across these groups.

Results:

A Pearson Chi-Square test indicated that language preferences differed across the experimental groups (x²(6)=255.96, p<.001, w=.61). Autistic respondents showed a strong preference for identity-first language (77%), while parents (65%), professionals (63%), and the broader community (60%), showed a preference for person-first language.

Conclusions:

Our results suggest that in Canada autistic adults prefer identity-first language. Despite this, the community around them prefers person-first language. The use of person-first language and its association with the medical model of disability may promote feelings of autism stigmatization. Rates of mental health difficulties are strikingly high among autistic individuals, with research suggesting that experiences of autism acceptance may contribute to improved mental health in autism (Cage et al, 2018). Thus, educating Canadians on the language preferences of autistic people may promote feelings of acceptance, decrease stigmatization, and ultimately improve the mental health of autistic people. Future research will further explore the relationship between language preferences, autism acceptance, and mental health.

418.395 (Poster) Loneliness, Friendships, and Romance in Autistic Adulthood: Understanding the Role of Empathy
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Background: Compared to neurotypical peers, autistic adults often experience more social rejection, isolation, and loneliness in friendships and romantic relationships (Orsmond et al., 2013; Ee et al., 2019, Eaves & Helena, 2008), highlighting a need to explore factors contributing to social engagement and loneliness within this population. Empathy is one’s capacity to recognize and emotionally experience others’ thoughts and emotions, and has been shown to be positively correlated with friendship formation and inversely correlated with loneliness in typically developing individuals, establishing empathy as a key variable in one’s social experience (Ciarrochi et al., 2017; Beadle et al., 2012). Given the complexities in the literature demonstrating unique empathy profiles and challenges with perspective-taking in this population (Quinde-Zlibut et al., 2021), understanding the role of empathy in social interactions among autistic young adults is of great importance.

Objectives: This study investigates the role of empathy in the social engagement and loneliness of autistic young adults. We hypothesized that greater empathy would be associated with increased social engagement and decreased loneliness.

Methods: Participants included 96 adults (79% male; M_age=22.3, SD=3.7) with historical autism diagnoses that were confirmed by elevated scores on the Social Responsiveness Scale, Second Edition (SRS-2 Total T-score ≥ 60; Constantino & Gruber, 2012), who presented for treatment at the University of California, Los Angeles (UCLA) Program for the Education and Enrichment of Relational Skills (PEERS®) Clinic. Empathy and loneliness were assessed pre-intervention through self-report on the Empathy Quotient (EQ; Baron-Cohen & Wheelwright, 2004) and the Social and Emotional Loneliness Scale for Adults (SELSA; DiTommaso & Spinner, 1993), respectively. Social engagement was assessed through caregiver- and self-reported get-togethers and romantic dates on the Quality of Socialization Questionnaire (QSQ; Laugeson, 2017).

Results: Findings revealed no significant correlations between empathy and QSQ get-togethers or romantic dates, p’s>.05. However, empathy was significantly and negatively correlated with total loneliness, r=-.39, p<.001, romantic loneliness, r=-.27, p=.01, and social loneliness, r=-.36, p<.001, on the SELSA. Further, in a regression including both total EQ score and QSQ get-togethers as predictors of overall loneliness on the SELSA, only empathy emerged as a significant predictor of loneliness, h(74)=−3.14, p=.002, over and above social engagement per the QSQ.

Conclusions: Results suggest that higher empathy in autistic young adults is associated with less loneliness, replicating previous findings from typically developing samples (Beadle et al., 2012). However, in contrast to our hypothesis, no association was found between
empathy and social engagement. Interestingly, empathy emerged as a more potent predictor of loneliness than social engagement, suggesting that, relative to frequency of social interactions, empathy may correspond more closely to greater feelings of social connectedness in autistic adults. Such results imply that enhanced empathetic capabilities learned through evidence-based social skills interventions, such as PEERS® for Young Adults (Laugeson, 2017), may also contribute to reduced loneliness in autistic adults. To clarify these findings, future research might aim to replicate these results in a broader sample more representative of the autistic community and confirm the directionality of the relationship between empathy and loneliness via cross-lagged panel modeling.

418.396 (Poster) Cognitive Alexithymia As Mediator of Empathy in Autism
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Background: Autistic individuals present with persistent difficulties in social interaction. Alexithymia has been found approximately 50% of autistic people, and is reportedly associated with individuals’ social deficiency. The cognitive domain of alexithymia, the inability to identify, analyse and verbalise emotions, has also been found to be associated with impaired empathy.

Objectives: This current research examines the strength and direction of the relationship between cognitive alexithymia, autism, and empathy. It explores the possibility that the relationship between empathy and autism is mediated by cognitive alexithymia.

Methods: Using a sample of 56 autistic (Mage=13.85, SD=3.06) and 48 non-autistic adolescents (Mage=14.13, SD=3.19), cognitive alexithymia, autistic traits, and empathy were assessed using standardised assessments delivered face-to-face. The mediating role of cognitive alexithymia of empathy in autism was further explored using multiple regressions with age and gender as covariates.

Results: Cognitive alexithymia positively associated with autistic traits (b=0.87, SE=0.15, p<.001) while negatively related to empathy (b=-0.40, SE=0.09, p<.001) after controlling for the difference in age and gender. Autism did not directly predict empathy (b=0.08, SE=0.16, p=.311). However, this relationship became significant in the presence of cognitive alexithymia, with results indicating that the relationship between autism and empathy was fully mediated by cognitive alexithymia (b=-0.27, SE=0.15, p<.001, R²=3.51).

Conclusions: Findings suggested the reduced ability in social interaction found in autistic individuals was possibly explained by their difficulties in recognising and expressing their emotions. These findings emphasise the important impact alexithymia may have in autism. It is recommended that diagnostic assessment for alexithymia should be undertaken before providing social training or assistance for autistic people. Various types of targeted treatment could be explored to help autistic patients strengthen their cognitive emotional processing, hopefully enhancing their social performance. However, future research will be needed to clarify these questions.

418.397 (Poster) Do Social Skills Predict Subjective Wellbeing in Autistic Adolescents?
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Background: Adolescence is a challenging time, particularly for autistic individuals. Social skills interventions are often recommended to improve autistic subjective wellbeing, as greater social skills are thought to strengthen supportive friend and peer networks and reduce the risk of peer rejection and victimisation. However, research addressing the relationship between social skills and subjective wellbeing is limited.

Objectives: This study aimed to address this gap, hypothesising a positive relationship between social skills and subjective wellbeing in autistic adolescents and an interaction effect between gender and social skills on subjective wellbeing.

Methods: An in-person standardised measure of subjective wellbeing was completed in person by 56 autistic adolescents and 48 non-autistic adolescents (aged 10-22 years); their caregivers completed a standardised measure of social skills. The relationship between social skills and subjective wellbeing was examined by regression, while two 2-way analyses of covariance tested whether the relationship was moderated by gender.

Results: Socialisation, communication, age, gender, and diagnosis accounted for a significant 12% of the variability in subjective wellbeing, R² = .12, F (5,98) = 2.69, p = .029, a small to medium effect. Diagnosis was the only significant indicator, p = .024, explaining 5% of unique variance in the model. There was a statistically significant two-way interaction in the autistic group between socialisation and gender, F(1,47) = 7.85, p = .007, partial η² = .14, a large effect. There were no other significant interactions.
Conclusions: Contrary to popular belief, this study found that the relationship between social skills and wellbeing was not straightforward. While the regression model explained a small to medium amount of subjective wellbeing variance, by themselves social skills were not a significant predictor of subjective wellbeing. Exploratory analyses found the amount of subjective wellbeing variance explained may vary by gender and diagnosis. An interaction was found between gender and socialisation, suggesting enhanced social skills support may especially assist female adolescents in coping with the transition to adolescence. More research is needed to understand the impacts of social skills on wellbeing.

418.398 (Poster) A Meta-Analysis Examining the Relationship between Cognitive Inflexibility and Internalising and Externalising Symptoms in Autistic Children and Adolescents


Background:

Compared to neurotypical (NT) peers, autistic children and adolescents can exhibit greater cognitive inflexibility (CI), which can reduce ability to adapt to novel situations or generalise problem solving skills across settings. Measurement of CI in autistic young people via both parent-reports and neuropsychological tasks have suggested that greater CI is a risk factor for both externalising (EXT) and internalising (INT) symptoms across adolescence and early adulthood, though the magnitude of such association has not been systematically explored. Examining the relationship between CI and INT and EXT symptoms may help clinicians gain insight into whether directly targeting CI can boost treatment accessibility and engagement and increase positive outcomes when working with autistic young people.

Objectives:

- Evaluate the association between CI and a) INT and b) EXT symptoms in autistic young people.
- Explore how moderators (e.g., age, gender, full-scale IQ (FSIQ) etc) may influence the associations from objective 1.

Methods:

A systematic search of peer-reviewed literature published until 11th April 2022 across PubMed, EMBASE, MEDLINE, PsycINFO and Web of Science identified articles that included: 1) Participant: autistic young people aged 0-24 years; 2) Exposure: at least one CI measure; 3) Comparison: (optional) NT comparison group; 4) Outcome: at least one INT/EXT symptom measure. 283 of the 7954 identified articles were assessed for eligibility. 24 studies included for quality appraisal and qualitative synthesis, and 9 included for meta-analysis. A pooled effect size using Pearson’s correlation between CI and INT/EXT was calculated and the moderating effects of age, sex, FSIQ and study quality were investigated using meta-regressions. Sensitivity analyses were completed to investigate the impact of measure variance for CI and co-occurring ADHD on the overall effects.

Results:

Systematic review included 21 studies (n = 1608) of CI and INT, and 15 studies (n = 1115) of CI and EXT. Greater CI (Figure 1) is associated with increased INT (9 studies; n = 833; r = .39 (moderate effect), 95% CI [0.32, 0.46]) and EXT (6 studies; n = 295; r = .48 (large effect), 95% CI [0.38, 0.58]). A non-significant moderator effect was observed for participants’ age, % male, FSIQ, and study quality. Results were consistent when only using parental reports of CI and excluding autistic adolescents with co-occurring ADHD.

Conclusions:

This is the first meta-analysis to show the positive association between CI, INT and EXT in autistic young people, highlighting that greater CI in ASD may result in less flexible ways of adapting with cognitive and social challenges during adolescence, further increasing vulnerability to developing INT and EXT symptoms due to poorer emotional regulation. However, given that most studies relied only on parent-measures, the strength of current associations may be inflated due to shared method variance. Future studies may adopt longitudinal designs drawing on various CI assessments to test direction of causation between CI, emotion dysregulation, and INT/EXT symptom development. Assessment and incorporation of CI into person-centred formulation may inform clinicians on how best adapt interventions when working with autistic young people with co-occurring mental health difficulties.

418.399 (Poster) Exploring the Association between Cognitive Inflexibility, Irritability, and Depressive Symptoms in Relation to Autism Traits in Adolescents
Background:
Cognitive inflexibility (CI) refers to poorer shifting in cognitions and behaviours in response to changing environmental demands. CI is often observed amongst autistic individuals and has been associated with increased depressive symptoms across development. However, it is unclear to what extent CI may be a unique risk factor in predicting depressive symptoms above and beyond autism traits, and other risk factors such as increased irritability. Given the prevalence of using parent-report CI in literature, it is important to understand CI measurement concordance across parent and adolescent reports to explore informant bias.

Objectives:
- To explore the concordance rate between parent and self-report measures of CI
- To explore the association between irritability, CI, and depressive symptoms in adolescents when accounting for autism traits.

Methods:
35 young people (10 with ASD) and 44 parents recruited from the community completed online questionnaires. Autism traits (AQ-10), depressive symptoms (RCADS-Depression) and irritability (Affective-Reactivity Index) were measured by parent-reports only. CI was measured by both parent report (Flexibility Scale-Revised; FLEX-P) and young person self-report (Detail and Flexibility Questionnaire; D-FLEX). The association between FLEX-P and D-FLEX was explored using Pearson’s correlation. To control for construct overlap between special interests and social inflexibility subscales (FLEX-P) and autism traits, a new FLEX-P total was calculated by summing together the subscales of Routine/Rituals, Transitions/Change, and Generativity (FLEX-RRTCG). Two independent stepwise linear regression models were constructed to explore the association between 1) irritability, 2) autism traits; 3) CI (FLEX-RRTCG and D-FLEX respectively) and depressive symptoms in young people.

Results:
Aim 1: Only Routines and Rituals subscale of FLEX-P showed significant positive association with D-FLEX, suggesting poor concordance rate across informants. Aim 2: FLEX-RRTCG accounted for 7% variance in young people’s depressive symptoms above and beyond the effects of irritability and autism trait ($F(3,40) = 9.01, p < .001$) (Table 1a), and fully mediated the association between autism traits and depressive symptoms (90% Bootstrapped CI [0.068, 1.370]) (Figure 1). In contrast, D-FLEX accounted for an additional 14% of the variance in depressive symptoms when accounting for irritability and autism trait ($F(3, 31) = 5.79, p = .003$), though autism trait remained significantly associated with depressive symptoms (Table 1b).

Conclusions:
Increased cognitive rigidity and perseverative behaviour due to CI goes beyond that of restricted behaviour and circumscribed interests associated with core ASD symptoms and is uniquely associated with increased vulnerability for experiencing depressive symptoms. Directly targeting CI may increase young people’s ability to access and engage with change-focused interventions such as CBT for depression, as they may be better able to flexibly monitor and challenge their unhelpful thinking and behavioural patterns that maintain depressive symptom severity and duration. The poor concordance rate across informants suggests that parents may be better at reporting overt distress associated with CI, and young people better at recognising covert cognition and emotions associated arising from CI. Integrating multiple informant measures is crucial for clinicians to better understand the impact of CI on depression to inform formulation and treatment plan.

418.400  (Poster) Verbal Engagement and Behavioral Synchrony in Face-to-Face Versus Video-Based Social Interactions of Adolescents with and without ASD with a Neurotypical Stranger
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Background: Evidence suggests that using computerized platforms challenges social communication, by hindering mutual understanding and feelings of connectedness. These important factors of social interaction are linked to behavioral synchrony, the spontaneous coordination of behaviors between interacting partners in both form and timing. How interaction is affected by computerized platforms
seems to be of great relevance nowadays, particularly for adolescents who increasingly use video chats for socializing purposes. Yet, this was not examined among autistic adolescents, who often report alterations and difficulties in social interaction.

Objectives: To examine verbal engagement and behavioral synchrony of autistic and neurotypical (NT) adolescents in two settings: face-to-face and video-based social interactions.

Methods: 44 male adolescents (22 with a formal diagnosis of ASD given by a clinical psychologist/psychiatric) participated in face-to-face social interactions, and 49 male adolescents (23 with ASD), participated in Zoom video-based interactions. Groups were comparable on age and verbal abilities (Table 1). The interactions included a friendly conversation with an undergraduate female student, following an instruction to “get to know each other”. Using codes from the PEBA paradigm (Zadok et al., 2021), the third minute of the interaction was coded by trained naïve coders for participants’ commenting and asking questions and synchronization of facial expression, vocalization and affect.

Results: On average, autistic adolescents commented less and showed lower synchronization with the social partner, compared to NT adolescents. Several Group X setting interactions were found: Whereas in video conversations autistic adolescents were coded lower on comments and vocal synchrony compared to NT adolescents, in face-to-face interactions there were no such differences. Further, whereas autistic adolescents’ facial expression synchrony was coded higher in video conversations compared to face-to-face interactions, among NT adolescents there was no such difference (Figure 1).

Conclusions: Our findings suggest disparities between autistic and NT adolescents in their use of comments and in their vocal synchrony with a social partner, only in video conversations. It appears that when considering aspects of social behavior that highly rely on verbal expression, video conversations, but not face-to-face interactions, produce disparities between autistic and NT adolescents. Video conversations may have imposed a particular challenge upon autistic adolescents and burdened their efforts to converse with the social partner. Alternatively, NT adolescents may have felt more comfortable to engage in video conversation with a stranger, whereas face-to-face “get to know” conversations may have felt more awkward for them. Interestingly, different patterns were also observed for facial expression synchrony: autistic adolescents, but not NTs, were more synchronized with the social partner in video conversations compared to face-to-face conversations. Possibly, the restriction of the camera only to the partner’s head area facilitated a focus of attention on her face, and by that, promoted facial expression synchrony, whereas in real life interaction physical distance and the availability of multi-channel socio-emotional information makes facial expression synchrony more challenging for autistic adolescents. Further research into the characteristics of online interactions of autistic adolescents is needed.

**POSTER SESSION — SOCIAL COGNITION AND SOCIAL BEHAVIOR**

**437 - Social Cognition and Social Behavior II**

**437.316 (Poster) Pupil Contagion in Williams Syndrome: No Transfer of Arousal from Other’s Eyes**

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**Background:** Williams syndrome (WS, prevalence 1:7500) is characterized by markedly increased social drive and interest in other’s faces and eyes. Since the genetic cause is known, studies of WS contribute to our understanding of the biology of human sociability. The processes underlying social challenges and strengths in Williams syndrome remains unclear. Despite their high social drive, it is typically challenging for individuals with WS to establish social reciprocity and interpret other’s facial expressions, and elevated autistic symptoms are common. These social challenges cannot be solely explained by an intellectual disability.

Typically developing humans automatically adapt their pupil size to that of others. This phenomenon, termed *pupil contagion*, reflects spontaneous synchronization of arousal and is believed to facilitate social interaction.

**Objectives:** N/A

**Methods:** We examined pupil contagion effects in two independent samples with WS (total n = 48) and comparison groups of typically developing adults (study 1, n = 50) and infants aged 4-6 months, the earliest age when pupil contagion has been reported (study 2, n = 48).
Data were analyzed using Bayesian statistics. Using this method, it is possible to differentiate between three possible outcomes: that the hypothesis is best supported, that the null hypothesis is best supported, and that the data is inconclusive.

Results: In both studies, data supported the null hypothesis that pupil contagion does not exist in Williams syndrome (Bayes factors supporting the null hypothesis > 12). In contrast, evidence for a pupil contagion effect was found in typically developing adults and infants (Bayes factor supporting the hypothesis > 7).

Conclusions: The results suggest that individuals with WS do not spontaneously mimic other’s pupil size. As pupil contagion was seen in four months old infants, this represents a deviation from the typical developmental trajectory at a very early stage. Diminished synchronization of arousal may explain social interaction challenges in WS. We also conclude that pupil contagion is not a necessary consequence of high social drive.

437.317 (Poster) Pupillary Response in Social Emotion Tasks in Autism
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Background: Individuals with autism spectrum disorder (ASD) have a poorer performance in emotional expression recognition in the Reading the Mind in the Eyes Task, as well as a distinct emotional response while viewing social touch scenes. Eye Avoidance Hypothesis, Theory of Mind deficits and sensory sensitivity had been proposed to understand the emotional and physiological response to socio-affective images in autism. It is still unclear how pupillary response in ASD towards socio-affective tasks.

Objectives: This study investigated pupillary response in adults with ASD when viewing emotional faces and interpersonal touch scenes.

Methods: We recruited 59 individuals with ASD (aged 29.7±5.9 years) and 36 typically developing controls (TDC, aged 23.3±2.1 years). All participants completed the Autism-Spectrum Quotient (AQ), Empathy Quotient (EQ), and pupil size estimation by the Tobii X2-30 Eye Tracker when performing the Reading the Mind in the Eyes Test and the Socio-Affective Touch Expression Database (SATED) dataset

Results: ASD adults exhibited a smaller minimal pupil size, a larger maximal pupil size and standard deviation (SD) of pupil size compared to TDCs in both tasks, especially in the Face Task. Sensory sensitivity positively correlated to mean pupil size in ASD. The AQ scores were correlated with maximal pupil size and SD of pupil size, while the EQ scores were negatively correlated with those pupil parameters in ASD.

Conclusions: Adults with ASD may have different pupillary response during socio-affective tasks than TDCs. Whether this is due to abnormal regulation on pupillary response or higher anxiety during socio-affective tasks awaits further investigation. The relationship between pupil response and sensory sensitivity or autistic traits in ASD is worth clinical and research attention.

437.318 (Poster) Relation between Social Orientation and Joint Attention in Idiopathic Autism and Phelan-Mcdermid Syndrome Using Eye Tracking Technology
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Background: There is extensive research showing that individuals with autism spectrum disorder (ASD) have difficulty with joint attention tasks, attention, and scanning of social scenes. However, little is known about how these skills relate to each other and whether more basic social attention relates to the ability to perform more complex social behavior, such as joint attention. In this study, we assessed the relationship between attention, exploration of social stimuli, and joint attention in two groups: idiopathic autism (iASD) and Phelan-McDermid syndrome (PMS), a genetic disorder with a high prevalence of ASD. Previous comparisons of iASD and PMS revealed that individuals with PMS show less impairment in social engagement but more attention difficulties (Richards et al., 2017).

Objectives: This study examined whether children with ASD with and without PMS had similar patterns of relationships between social dwelling and joint attention success.

Methods: Eleven participants with ASD (6 with PMS) between the ages of 4 and 12 years (iASD: M = 9; PMS+ASD: M = 7), participated in two eye-tracking tasks: Visual Paired Comparison (VPC) and Joint Attention (JA). Task 1, VPC, presented two images of the same face (familiarization), afterwards, one of the images was replaced with a novel face. Dwell time and rate of looking between interest areas, including the face, eye, and mouth regions, of both familiarization and novel images were computed. Task 2, JA, presented two objects and a central actor. The actor looks toward one of the objects (target) and not the other (distractor). The proportion of trials where subjects looked to the target object first and the proportion of time spent looking at the target vs. distractor were computed.
Results: Overall, the iASD and PMS groups did not differ in how they completed either task (Table 1), with the exception of mouth dwelling during social exploration, where children with iASD spent longer looking at the mouth as compared to the face than children with PMS+ASD ($r=0.30$). Across groups, average time dwelling on eye regions during social exploration on Task 1 was positively correlated with successful looks to the target ($r=0.655; p=0.029$) and time looking at the target ($r=0.638; p=0.035$) on Task 2. These relationships also held when indexing social exploration patterns after the novel stimulus presentation on Task 1 (Looks to target: $r=0.724; p=0.012$; Time looking at target: $r=0.605; p=0.049$).

Conclusions: These results suggest that for children with ASD, regardless of the genetic diagnosis of PMS, the more the child explores eye regions in social stimuli, the better they are at joint attention, which requires following of gaze cues. This suggests that in ASD and in PMS specifically, interventions that encourage eye-contact may be effective in supporting their ability to follow joint attention, thereby increasing opportunity for shared social experiences. Future research should be completed in order to validate these conclusions with larger sample sizes.

437.319 (Poster) Relationship between Sleep Quality and Anxiety in Individuals with and without ASD

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Background: Sleep dysfunction is extremely common for individuals with ASD, with between 50-80% of youth with ASD experiencing sleep dysfunction and difficulty (Mazzone, 2018). Autistic individuals may also have difficulties with emotional regulation, including anxiety, depression, and general mood disturbance. A longitudinal study within ASD youth and a comparison group of youth with typical development found that parasomnias, sleep duration, and night awakening were significantly associated with internalizing behavioral problems within the autistic group (Williamson, etc., 2020). Anxiety is one of the most common internalizing behavioral issues and is also a prevalent comorbidity among those with ASD (Vasa, 2015).

Objectives: Due to the high rates of co-occurring anxiety in youth with ASD, this project aims (1) to replicate previous findings of a relationship between sleep quality and internalizing symptoms in autistic youth and a comparison group of typically developing youth, (2) investigate the specific relationship between anxiety and sleep quality, and (3) identify if the relationship between anxiety and sleep dysfunction differs for autistic males vs autistic females.

Methods:

Data was included from a NIH funded study on sex and gender differences in ASD. The sample included 107 participants (ASD=55), ages 12-26 years. ASD diagnosis was confirmed via the ADOS-2. Participants completed the Pittsburgh Sleep Quality Index (PSQI) and Munich Chronotype Questionnaire (MCTQ) self-report questionnaires, measuring sleep quality. We utilized the Child Behavior Checklist youth self report and Adult Self Report internalizing behavior subscale and the Screen for Child/Adult Anxiety Related Disorders generalized anxiety disorder and global score as a measure of anxiety.

Results:

Groups were split into youth (12-17 years) and adults (18-26). Preliminary results from autistic adults indicate a significant positive correlation between PSQI global and ASR internalizing behavior ($r=0.62$, $p<0.01$), (Figure 1) indicating poor sleep quality corresponds to higher internalizing scores for autistic adults. Similarly, a significant positive correlation was present between PSQI total score and SCAARED for both the ASD ($r=0.66$, $p<0.01$) and TD groups ($r=0.31$, $p<0.05$); and for PSQI total score and the generalized anxiety disorder subscale of the SCAARED (ASD $r=0.72$, $p<0.01$; TD $r=0.33$, $p<0.05$).

Conclusions:

The initial findings of this research are consistent with prior research studies that have found a significance relationship between increasing sleep dysfunction and increased internalizing issues. Correlations were significant for the relationships between overall sleep quality and broad internalizing behaviors, as well as specific anxiety symptoms. Follow-up analysis will examine sex differences within this relationship, along with using the MCTQ sleep measure for more quantitative sleep data.

437.320 (Poster) Role of Attention and Sensory Distraction in Social Processing for Youth with and without Autism: A fMRI Study

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Results: Overall, the iASD and PMS groups did not differ in how they completed either task (Table 1), with the exception of mouth dwelling during social exploration, where children with iASD spent longer looking at the mouth as compared to the face than children with PMS+ASD ($r=0.30$). Across groups, average time dwelling on eye regions during social exploration on Task 1 was positively correlated with successful looks to the target ($r=0.655; p=0.029$) and time looking at the target ($r=0.638; p=0.035$) on Task 2. These relationships also held when indexing social exploration patterns after the novel stimulus presentation on Task 1 (Looks to target: $r=0.724; p=0.012$; Time looking at target: $r=0.605; p=0.049$).

Conclusions: These results suggest that for children with ASD, regardless of the genetic diagnosis of PMS, the more the child explores eye regions in social stimuli, the better they are at joint attention, which requires following of gaze cues. This suggests that in ASD and in PMS specifically, interventions that encourage eye-contact may be effective in supporting their ability to follow joint attention, thereby increasing opportunity for shared social experiences. Future research should be completed in order to validate these conclusions with larger sample sizes.

437.319 (Poster) Relationship between Sleep Quality and Anxiety in Individuals with and without ASD

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Background: Sleep dysfunction is extremely common for individuals with ASD, with between 50-80% of youth with ASD experiencing sleep dysfunction and difficulty (Mazzone, 2018). Autistic individuals may also have difficulties with emotional regulation, including anxiety, depression, and general mood disturbance. A longitudinal study within ASD youth and a comparison group of youth with typical development found that parasomnias, sleep duration, and night awakening were significantly associated with internalizing behavioral problems within the autistic group (Williamson, etc., 2020). Anxiety is one of the most common internalizing behavioral issues and is also a prevalent comorbidity among those with ASD (Vasa, 2015).

Objectives: Due to the high rates of co-occurring anxiety in youth with ASD, this project aims (1) to replicate previous findings of a relationship between sleep quality and internalizing symptoms in autistic youth and a comparison group of typically developing youth, (2) investigate the specific relationship between anxiety and sleep quality, and (3) identify if the relationship between anxiety and sleep dysfunction differs for autistic males vs autistic females.

Methods:

Data was included from a NIH funded study on sex and gender differences in ASD. The sample included 107 participants (ASD=55), ages 12-26 years. ASD diagnosis was confirmed via the ADOS-2. Participants completed the Pittsburgh Sleep Quality Index (PSQI) and Munich Chronotype Questionnaire (MCTQ) self-report questionnaires, measuring sleep quality. We utilized the Child Behavior Checklist youth self report and Adult Self Report internalizing behavior subscale and the Screen for Child/Adult Anxiety Related Disorders generalized anxiety disorder and global score as a measure of anxiety.

Results:

Groups were split into youth (12-17 years) and adults (18-26). Preliminary results from autistic adults indicate a significant positive correlation between PSQI global and ASR internalizing behavior ($r=0.62$, $p<0.01$), (Figure 1) indicating poor sleep quality corresponds to higher internalizing scores for autistic adults. Similarly, a significant positive correlation was present between PSQI total score and SCAARED for both the ASD ($r=0.66$, $p<0.01$) and TD groups ($r=0.31$, $p<0.05$); and for PSQI total score and the generalized anxiety disorder subscale of the SCAARED (ASD $r=0.72$, $p<0.01$; TD $r=0.33$, $p<0.05$).

Conclusions:

The initial findings of this research are consistent with prior research studies that have found a significance relationship between increasing sleep dysfunction and increased internalizing issues. Correlations were significant for the relationships between overall sleep quality and broad internalizing behaviors, as well as specific anxiety symptoms. Follow-up analysis will examine sex differences within this relationship, along with using the MCTQ sleep measure for more quantitative sleep data.
Background:

Sensory over-responsivity (SOR), an extreme negative response to aversive sensory stimuli, impacts approximately 56-70% of individuals with autism spectrum disorder (ASD; Ben-Sasson et al., 2008). SOR often co-occurs with other psychiatric conditions (e.g., anxiety) and is associated with difficulties in social and adaptive functioning (Glod et al., 2015). Furthermore, autistic individuals with SOR may attribute greater attention to extraneous sensory information over social information (Green et al., 2018). A preliminary study that tested the effect of sensory distraction on social information processing found that tactile distractors increased activation in auditory language areas for TD youth whereas it decreased activation in these regions for ASD children (Green et al., 2018). Here, we sought to replicate these findings with more rigorous statistical thresholds, as well as explore these effects in later development (late childhood/early adolescence vs. late adolescence/young adulthood).

Objectives:

To investigate how tactile sensory distraction affects social information processing in ASD compared to TD youth, and how this relates to age.

Methods:

We used functional magnetic resonance imaging (fMRI) to examine brain responses in 20 ASD youth and 18 age- and IQ-matched TD participants, ages 8 to 15 years. Participants listened to 16 different social scenarios ending with either a sincere or sarcastic response and indicated if the person meant what he/she said. During half of the blocks, participants had their forearm rubbed with a mildly aversive fabric as a sensory distractor. Within- and between-group analyses were thresholded at $Z > 2.3$, $p > 0.05$.

Results:

During the social cognition task without tactile stimulation, we found that both groups exhibited activation in auditory regions, frontal areas associated with decision making, and regions associated with social attention and emotional regulation (e.g., the amygdala, and paracingulate gyrus). TD youth additionally exhibited activation in the fusiform gyrus (region involved in face and object recognition), but no significant between-group differences were found. As expected, with the addition of a tactile sensory distractor, both groups showed significantly increased activation in sensory cortical regions. The TD group, but not the ASD group, also showed increased activation in the auditory cortex, basal ganglia, and posterior cingulate gyrus (associated with attention allocation). These results are consistent with prior findings, and suggest that the TD group is recruiting more attention to social information to continue to process the social information despite the presence of a sensory distraction.

Additional analyses will incorporate an older cohort of adolescents and young adults to investigate whether attention to social information is managed differently across different groups.

Conclusions:

Our findings corroborated previous work (Green et al., 2018) at a more stringent statistical threshold. We found that during sensory distraction, TD youth increased effortful processing in language and attention brain areas, whereas the ASD group did not. For the ASD group, difficulties increasing attention and language-processing regions during sensory distraction could contribute to ASD-related social difficulties in real-world settings in which there are many competing stimuli. Additional analyses will test a wider age range to understand generalizability of this result to older adolescents and young adults.

437.321 (Poster) Self-Reported Eye Contact Sensitivity and Face Processing in 22q11.2 Deletion Syndrome

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Background: Chromosome 22q11.2 deletion syndrome (22qDS; prevalence 1:4000) is caused by a deletion on the long arm of chromosome 22. Phenotypically, individuals with 22qDS show a wide range of symptoms with an increased prevalence of autism and psychotic disorders. Individuals with 22qDS present impairments in social skills and atypical scanning patterns of other people’s faces, marked – at a group level – by reduced visual exploration of the eye region, potentially resulting in negative effects on social functioning and emotional processing. The genetic uniformity, along with diverse phenotypes of 22qDS, represent a unique model for identifying potential behavioural biomarkers.
Objectives:

The aim of the present study was

(1) to characterize individual differences in self-reported eye contact sensitivity and to explore qualitative features of this discomfort;

(2) examine how these data relate to objective measures of gaze patterns during the presentation of images of faces;

(3) how reported eye contact sensitivity related to neurodevelopmental/psychiatric outcomes (specifically, frequency of ASD and psychosis), everyday global functioning (with the Global Assessment of Functioning [GAF]) and IQ.

Methods: The participant sample consisted of 27 individuals (15 females) between the ages of 18 and 50, (M = 28.43, SD = 7.23) with genetically confirmed 22qDS. First, a short clinical interview was conducted assessing whether they experience discomfort during eye contact, the extent of it, and use of any coping mechanisms in dealing with it. Then, participants were presented with 24 6-sec photographs of angry, happy and neutral faces. Finally, as part of a larger study on this population, information on the presence of autism, psychosis, level of IQ and global assessment of functioning was conducted.

Results:

(1) Of the 27 participants, 12 reported discomfort with eye contact and most employ some type of strategy in dealing with it.

(2) Eye tracking findings show difference in the amount of looking in the eye region but only for neutral expression. Significant group differences were found laterization (Figure 2).

(3) Groups also did not differ on IQ, with both subgroups scoring characteristically low ([Ms = 73], Mann- Whitney U = 97.5, p = 0.719). Significant group differences, however, were evident in the level of everyday functioning on the GAF (p = 0.03), with those reporting difficulties with eye contact scoring lower in this regard.

Conclusions: Our results show that by simply asking individuals about eye gaze discomfort, we can not only gain insight into the nature and coping strategies of the individual, but that such information can also help us identify a subgroup of people with 22qDS who show distinct alterations in face processing lateralization, and who present more difficulties in everyday life.

Figure 2. The percentage of gaze within the left- and the right- half of the face (from the observer’s perspective) in the group of individuals with 22q11.2 deletion based on self-reported discomfort with eye contact.

437.322 (Poster) Sensitivity to Observing Social Exclusion in Individuals with Low and High Levels of Autistic Traits

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Background:

Observing someone being excluded elicits an experience of ‘vicarious ostracism’, sensitivity to the emotional distress of the victim, and prosocial behaviour. The intensity of these responses has been found to heighten with increased perspective taking ability and empathy. The empathy imbalance hypothesis proposes autism is associated with heightened sensitivity for emotional empathy but a lower capacity for cognitive empathy, which is related to perspective taking.

Objectives:

We examined the responses of participants with low and high levels of autistic traits (AT) to observing someone being excluded. The groups were compared on their empathic concern towards, and the perceived mood of the excluded player, and whether the mood and need satisfaction of the participants themselves was affected by observing the exclusion. We hypothesised that any differences in response to the excluded player between individuals with high and low levels of AT could be attributed to differences in trait empathy.

Methods:
Participants with high ($N=44$) and low ($N=38$) levels of AT were recruited through Prolific Academic. Autistic traits were assessed using the Autism Quotient (Cohen’s $d=5.26$ for group difference in AT scores). Participants observed Cyberball, an experimental paradigm widely used for eliciting responses to social exclusion. Pre-programmed “players” threw a ball between themselves, with the target player having a lower chance of being thrown to (5%) compared to the other players (45%). Participants observed the game while ‘taking on’ the perspective of the target player. They rated their own trait empathy, and mood before and after Cyberball. Following Cyberball, participants also rated their empathic concern for each player and also completed a need satisfaction questionnaire (addressing needs affected by social exclusion) from the perspective of each player, and mood questionnaire from the perspective of the target player.

**Results:**

Both AT groups reported greater empathic concern for the target player than for the non-target players, but this difference was more pronounced for the low AT group, ($p=.01$, $\eta^2=.07$; Figure 1). Multiple regression analysis showed that the effects of AT group on empathic concern for the target player were partly explained by trait empathy ($p=.01$). Both AT groups reported a decrease in mood post-Cyberball ($p<.001$, $\eta^2=.26$). Need satisfaction was rated lower for the target player compared to the non-target players ($p<.001$, $\eta^2=.85$), with this difference comparable for high and low AT groups. High and low AT groups rated mood of the target player comparably.

**Conclusions:**

This study showed that participants with low and high levels of AT identified to a similar extent the emotional distress of someone being excluded and the threat this posed to their social needs, and experienced comparable levels of vicarious ostracism (low mood). The results also showed that individuals with high levels of AT experienced sensitivity towards the excluded person (empathic concern), but not to the same extent as did individuals with low levels of AT. Differences in empathic concern between AT groups were partially explained by trait empathy.

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**437.323 (Poster) Sex Differences in the Placenta and Autism**

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**Background:**

Autism is a neurodevelopmental condition with a large heritable component in liability (Gaugler et al., 2014). Males are more likely to be diagnosed, even after taking into account camouflaging, misdiagnosis, diagnostic overshadowing and under-diagnosis in females (Lai and Szatmari, 2020). Prenatal environmental factors, such as steroid hormones and placental complications have been consistently associated with increased autism likelihood in children (Baron-Cohen et al., 2019; Maher et al., 2020). Typical male placentas have different gene expression patterns, produce more sex steroid hormones and have greater risk for specific complications, compared to females (Verburg et al., 2016; Gong et al., 2018). It is currently unknown how sex differences in the placenta interact with other autism likelihood factors.

**Objectives:**

To investigate the relationship between:

1. sex differences in placental complications and autism or autistic traits
2. sex differences in placental gene expression and the genetic liability for autism

**Methods:**

For the first objective: pregnancy complications, birth weight and placental weight were retrospectively assessed in expectant women, who consented to take part in the longitudinal “Generation R” cohort, in Rotterdam, the Netherlands. The complications included pregnancy-induced hypertension (PIH), preeclampsia (PE), spontaneous preterm birth (SPB) and being born small for gestational age (SGA). Subsequent assessment of autistic traits in the children at age 6 was based on 18-item abridged version of the Social Responsiveness Scale (SRS) (n=4,529). Diagnosis of autism was based on specialist medical records (n=75 males, n=12 females). Linear Regression models for autistic traits, and case-control group comparisons via Mann-Whitney U-tests for an autism diagnosis, were conducted and compared in terms of sex and the presence of pregnancy complications.

For the second objective: an enrichment analysis was conducted, based on a list of genes that corresponded to differentially expressed transcripts (FDR<0.1) between male and female placentas, in 1st trimester chorionic villi samples of viable pregnancies (Gonzalez et al.,...
2018). These were compared to a list of high-confidence autism genes, based on syndromic forms of the condition or an overabundance of rare variants in sequencing studies (SFARI database). The analysis was conducted separately for X-linked and autosomal genes and was controlled for gene length.

Results:

Children of pregnancies with complications had significantly higher autistic traits (Cohen’s D=0.14, p=0.0001). Males and females showed different patterns (Figure 1), with preeclampsia being associated with higher autistic traits only in males (n=86, Cohen’s D=0.21, p=0.022), and being born SGA only in females (n=269, Cohen’s D=0.29, p=0.0001). Autistic females were more likely to have had placental complications than autistic males and the undiagnosed population (χ²= 11.5, p=0.0007).

In addition, there was a significant enrichment for differentially downregulated genes in typical male placentas among autism genes that are found on the X-chromosome (p<0.001).

Conclusions:

The placenta may be a point of convergence, where genetic and environmental factors interact with sex, in order to increase autism liability differently in males and females.

437.324 (Poster) Smiling Synchrony Differences in Peer Dyads of Autistic and Neurotypical Youth
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Background: Autistic youth often experience challenges in interactions with peers, which has a negative impact on their mental health. One factor that may influence successful interactions with peers is synchrony, the degree to which interacting individuals align their behaviors (e.g. facial expressions) over time, which predicts positive interaction outcomes in neurotypical individuals. While some studies have demonstrated reductions in synchrony in dyads involving autistic individuals, no study has directly investigated synchrony in peer interactions or in autistic youth interacting with other autistic youth, a crucial link in determining if synchrony may be a mechanism in successful peer interactions.

Objectives: To evaluate differences in facial expression synchrony between peer dyads of autistic and neurotypical youth.

Methods: 136 youth (ages 8-16, 33 autistic, 103 neurotypical, 78 male, 58 female) were paired into same-gender dyads within a year of chronological age. Three dyad types were formed: autistic participants paired with autistic participants (AUT-AUT, n=7 dyads), autistic participants paired with neurotypical participants (AUT-NT, n=19 dyads), and neurotypical participants paired with neurotypical participants (NT-NT, n=42 dyads). In a video-recorded interaction in the lab, dyads completed a series of short activities together. These activities included a video-watching task in which dyads watched four short video clips designed to elicit positive (baby pig, toddler playing soccer) or neutral (tortoise, city street) emotions, and had the opportunity to discuss the clips with each other. A research assistant unaware of participant neurotype coded video recordings for smiling using the Facial Action Coding System; action units 6 and 12 represented smiling. Frame-by-frame smiling time series data for each participant was cross-correlated with the dyad partner’s time series with a lag of +/- 2 seconds. Correlation values were averaged across the lags to obtain a single value representing smiling synchronization. Dyads were excluded for not smiling during the interaction (n=8), being out of view of the recording (n=1), or previously knowing each other (n=1), for a final sample of 4 AUT-AUT dyads, 18 NT-AUT dyads, and 36 NT-NT dyads.

Results: A one-way ANOVA revealed significantly different smiling synchronization across the three dyad types (F(2,55)=4.60, p=0.01). Follow-up independent samples t-tests revealed that NT-NT dyads synchronized significantly more than AUT-NT dyads (t(52)=2.97, p<0.01). AUT-AUT dyads synchronized marginally more than AUT-NT dyads (t(20)=1.85, p=0.08) and did not differ in synchronization from NT-NT dyads (t(38)=0.04, p=0.97). Overall amount of smiling did not differ across the dyad types (F(2,55)=0.85, p=0.43).

Conclusions: These findings demonstrate that peer dyads with matching neurotypes synchronize their smiling more than peer dyads with mismatched neurotypes, and these results were not just a consequence of differences in overall amount of smiling. This is in line with a growing body of work demonstrating that social interaction outcomes differ for autistic individuals depending on whether they are paired with autistic or neurotypical individuals. Therefore, we highlight the importance of considering the role of the interaction partner and their neurotype when investigating social interaction behaviors in autism. Future research will directly investigate relations between synchronization and participants’ reported enjoyment of the peer interaction.

437.325 (Poster) Social Attention in Minimally Verbal Toddlers on the Autism Spectrum: An Eye-Tracking Study

Background: Minimally verbal autistic children comprise an estimated 30% of the spectrum, but remain an understudied and high-need group in the field (Anderson et al., 2007; Tager-Flusberg & Kasari, 2013). Assessing strengths and needs of minimally verbal children is challenging, as standardized assessments often involve verbal instructions which results in chronic floor performance in this group. Therefore, there is limited knowledge on key areas of functioning in this group, including the social and attention abilities that are foundational to verbal communication (Kasari et al., 2013). This study aimed to address this gap by using a passive view eye-tracking paradigm without verbal instructions to examine preferential orientation to social versus non-social stimuli, which has previously been linked to verbal development in young children (Puce & Bertenthal, 2015).

Objectives: We examined whether preferential attention to social versus non-social stimuli differed for minimally verbal autistic preschoolers (MV-ASD) compared to age-matched typically developing preschoolers (TD), and verbal autistic preschoolers (V-ASD).

Minimally verbal status was operationalized as an age equivalent below 18 months in the Expressive Language subdomains of the Vineland Adaptive Behavior Scales-3 or Mullen Scale of Early Learning (Bas et al., 2016). Our hypothesis was that only MV-ASD children would not show preferential attention to social versus non-social stimuli.

Methods: Following a previously validated eye-tracking paradigm (Vivanti et al., 2017), participants (N = 71; n_TD = 21, n_MV-ASD = 23, n_V-ASD = 27) aged 24.00 to 66.00 months (M = 34.00 months) were shown five digitalized images depicting naturalistic scenes that included people and objects similar in size and color contrast. Stimuli were shown for five seconds each on a computer monitor, and participants’ attentional response to the stimuli was recorded through a Tobii pro eye-tracking binocular system. Participants’ total duration of eye-gaze towards the social and non-social content of each image was averaged for social attention and non-social attention composite variables. Participants’ attention to social and non-social content across stimuli was analyzed using a repeated-measures 3 (Group: TD, MV-ASD, V-ASD) by 2 (Condition: social versus nonsocial attention) ANOVA.

Results: There was no significant Group x Condition interaction [F(2, 68) = .64, p = .52, η^2p = .01], but there were significant main effects of Condition [F(2, 68) = 31.68, p<.001, η^2p = .31] and Group [F(2, 68) = 7.74, p<.001, η^2p = .18]. While children in the MV-ASD group looked less at the stimuli overall, participants across groups showed preferential attention to social versus non-social content (see Fig. 1).

Conclusions: Although preferential attention to social versus non-social stimuli has been linked to the development of verbal language, we found that minimally verbal autistic children show similar patterns of attention to social and non-social stimuli compared to verbal autistic and typically developing toddlers. Our study highlights the value of socially-oriented teaching tools in intervention across the verbal and diagnostic spectrum. Passive viewing eye-tracking paradigms appear to be useful for measuring strengths and challenges in the social attentional domain for young autistic children and show particular promise for often overlooked minimally verbal children in future research.

437.326 (Poster) Social Disability and Loneliness at School in Early School-Aged Children with and without Autism Spectrum Disorder
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Background: Social inclusion is positively associated with more positive social interactions and academic achievement in school (Wentzel et al., 1995; Frederickson et al., 2002; Siperstein & Parker, 2008). Children with autism spectrum disorder (ASD) may be at increased risk for social isolation, compared to their typically developing (TD) peers, due to difficulties with social communication (Howlin et al. 2004; Mazurek and Kanne 2010; Rotheram-Fuller et al. 2010). Within children with ASD, those who are more socially competent are more likely to be placed in inclusion classrooms, and have been found to experience higher friendship quality (Lyons et al, 2011). Classroom contextual factors (such as inclusion model and student:teacher ratio), in turn affect the academic outcomes of children with ASD (Sutherland et al., 2008), and likely also influence social inclusion or isolation (and accompanying feelings of loneliness).

Objectives: (1) To investigate the relationship between social disability and loneliness in an early school-aged sample of children with ASD and their TD peers; (2) To explore the effects of classroom contexts (such as inclusion model) on this relationship.

Methods: This study includes children and caregivers—who previously participated in baby sibling research involving developmental assessments and eye tracking, to study infant development—once these children have entered kindergarten (~5 years old). Data collection is ongoing, with an anticipated sample of at least 40 (20 ASD) participant families by May 2023. Caregivers complete the Social Responsiveness Scale (SRS-2) as a measure of child social disability; children complete the Loneliness and Social Dissatisfaction Questionnaire (LDQ) in either questionnaire or interview format (depending on reading level); additionally, parents and current teachers provide information about the child’s school and classroom environments. Multiple regression will be used to determine the effect of child
social disability on school loneliness, and to investigate any moderating effects of classroom characteristics (such inclusion model) on this relationship.

Results: In a previously collected preliminary sample of TD (n=49, M_{age}(SD)=5.29(0.50) years), ASD (n=9, M_{age}(SD)=5.56(0.53) years), and children with other communication disorders (CD) (n=8, M_{age}(SD)=5.75(0.89) years), 56% of ASD, 33% of CD and 12% of TD children were enrolled in inclusive classrooms. Analysis of parent-reported child loneliness and social disability in this sample suggests a positive relationship between social disability and loneliness in school, which is significant across all diagnostic groups (r(63)=.77, p<.001), and within the ASD sample (r(9)=.75, p=.020).

Conclusions: Preliminary analyses suggest that caregivers of children with higher degrees of social disability perceive that their children experience greater loneliness in school. Though data collection is ongoing, children’s own reports of school loneliness and teacher reports of classroom contexts will allow for further investigation of this relationship, as well as potential moderating effects of classroom contexts. These findings will inform the design of classroom environments that minimize loneliness and/or maximize peer acceptance for children with ASD/social vulnerabilities.

437.327 (Poster) Social Interaction Development of Autistic Individuals and Siblings: A Systematic Review
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Background: Sibling relationships may play a unique role in developmental outcomes. For autistic individuals, high quantity and quality of intimate sibling social interactions can contribute to language and social development. Although some researchers investigate the involvement of siblings within focused intervention contexts, from a holistic view of family systems, there is much to be learned about the role non-autistic siblings may play in increasing exposure to language and social learning opportunities through, for example, modeling naturalistic language use and engaging in reciprocal interactions within daily routines. Therefore, a systematic review of existing literature that summarizes investigations of siblings relative to the development of social interactions by their autistic siblings is an important exploratory next step.

Objectives:
We explored the following research questions as part of this systematic review: 1) In what ways were siblings of autistic individuals involved in previous investigations of social interaction development? 2) What are the implications of involving siblings in social interaction intervention for autistic individuals?

Methods:
A keyword search in databases was conducted first to identify relevant studies following the PRISMA model for systematic reviews. Full-text screening was conducted based on the inclusion criteria: empirical studies involving participants who are autistic OR their non-autistic siblings addressing social interaction outcomes. The included articles were coded based on the following variables of interest: (a) research design, (b) research purpose, (c)independent variable, (d) dependent variable, (e) research settings, and (f) participant characteristics.

Results:

Research Question 1

A total of 105 studies were included in this review given the investigation of siblings and the social interaction of autistic individuals. Most of the included studies (78.10%) focused on the social interaction outcomes of the siblings of autistic individuals. Of those social interaction outcomes, more than half (55.24%) targeted comprehensive social interaction skills. Specific social interaction behaviors were investigated in 25.71% of studies. Almost all studies (97.14%) specified children as the participants. Reporting of other targeted variables in included studies was inconsistent (e.g., birth order = 54.29%, siblings’ gender/sex = 17.14%).

Research Question 2

Of the studies included in this review, a subset of 23 studies (21.90%) that focused on autistic participant outcomes were selected and analyzed for implications of involving siblings in social interaction interventions. The participants’ characteristics for each study can be found in Table 1. Table 2 presents a summary of the studies’ variables of interest. Overall, all 23 studies showed that non-autistic siblings could potentially improve social interaction skill acquisition and development of autistic individuals in natural contexts. Possible implications from this review include (1) identifying appropriate social interaction outcomes for autistic individuals, (2) exploring diverse roles and enhancing engagement of siblings, and (3) developing naturalistic sibling-mediated social interventions.
Conclusions:

Overall, the findings of this systematic literature review provide some evidence that social interaction outcomes of autistic individuals can be positively influenced by their siblings. More research is needed to have a greater understanding of how to better involve siblings in social interaction intervention for autistic individuals that consider the needs and wants of both parties.

437.328 (Poster) Social Motivation- a Double-Edged Sword for Autistic Children

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Background:

It is well-known that autistic children experience more anxiety than peers, but little research has explored how anxiety is associated with social functioning. Existing literature has more generally examined friendships, social motivation, bullying, and anxiety in autism, but has not explored the specific relationships between these factors. Understanding these relationships may contribute to determining intervention targets for anxious autistic youth.

Objectives:

To determine if there are associations between social motivation, friendships, and social anxiety in autistic children.

Methods:

This study analyzes data collected from the Specifying and Treating Anxiety in Autism Research (STAAR) Study, a five-year clinical trial comparing pharmacological and psychosocial anxiety interventions for autistic children. This sample includes 63 autistic children, aged 8-14 years (M =10.13, SD = 1.56 years), who met criteria for at least one anxiety disorder as defined by the Anxiety Disorder Interview Schedule-Parent (ADIS-P), which uses caregiver reports to assess individual anxiety disorders using 9-point rating scales (0-8, where scores ≥4 indicate the presence of a disorder). This study referenced participants’ Generalized Anxiety Disorder (GAD) and Social Anxiety Disorder (SAD) scores. Caregivers completed the recently published Autism Spectrum Addendum (ASA), in which friendships, social motivation, and bullying were rated by clinicians on a 4-point scale (0-3, with higher scores indicating higher impairment). Caregivers also completed the Child Behavioral Checklist, where they reported their child’s number of close friends. Chi square and one-way ANOVA analyses were used to examine the associations between anxiety, friendships, social motivation, bullying, and number of friends.

Results:

Of total participants, 74.6% met criteria for GAD and 47.6% for SAD. There was a significant relationship between the number of friends children had and the quality of their friendships, with more friends relating to closer relationships, X² (9, N = 46) = 20.88, p = .013. Friendship quality and social motivation were significantly related; less socially motivated children were more likely to lack meaningful friendships, X² (6, N = 60) = 22.67, p < .001. Children with less social motivation had fewer friends, X² (6, N = 46) = 16.99, p = .009. More socially motivated participants experienced more severe social anxiety, F(2, 52) = [3.43], p = .04. Participants with no friends experienced less severe social anxiety than those with at least one close friend, F(3, 42) = [2.63], p = 0.063. Bullying and social anxiety were unrelated, F(3, 51) = [1.21], p = 0.31.

Conclusions:

These findings suggest that autistic children with low social motivation form fewer close friendships, yet children with higher social motivation are likely to have more severe social anxiety. Bullying was unrelated to social anxiety. These outcomes illustrate the complexity of social interactions in autistic children, as socially motivated children are more socially connected yet seem to worry more about other’s perceptions of them. This highlights the need to support children who are interested in relationships by reducing anxieties they have about social interactions. Future directions include looking at qualitative data to understand these children’s specific social fears and use this to guide intervention practices.

437.329 (Poster) Social Perception and Understanding of Different Neurodivergent Behaviors in Young Children
Background: Young children understand social norms as arbitrary rules that guide behaviours depicted by individuals or a group of individuals (Legros & Cislaghi, 2020). During development, children become sensitive to norms, which they infer from adults or repeated group behaviours, (Riggs, 2020; Roberts et al., 2017; Schmidt et al., 2016). Children react negatively to peers who present behaviours that differ from these social norms, and since neurodivergent children's behaviours deviate from the norm (Sasson et al., 2017), this can contribute to peer rejection. However, it is unknown whether children perceive specific neurodivergent behaviours to be more socially acceptable than others and if this impacts upon their willingness to be friends with neurodivergent children.

Objectives: To assess current understanding of different neurodivergent conditions in young children as well as their willingness to have friendships with neurodivergent children. To explore which specific neurodivergent behaviours children perceive to be socially acceptable/unacceptable in a classroom.

Methods: Forty neurotypical children (18 males, 22 females) from diverse cultural backgrounds between 4-14 years of age participated in the study. A mixed method approach was taken which included an initial interview to assess current understanding and views of neurodivergent conditions (i.e. Autism, Attention Deficit Hyperactivity Disorder, Dyslexia). Following this, each child was shown a series of different pictures, each depicting children behaving differently in a classroom setting in response to the teacher’s instruction. They were informed which child in each picture was either autistic/ADHD/or dyslexic. Each child was asked to indicate which behaviours they would consider acceptable or not acceptable in each context. They were also asked if they would like the child in the friendship group (asked for both neurotypical and neurodivergent target).

Results: Key findings from the interviews showed a significantly greater proportion of children reported they knew an autistic individual (50%) compared to knowing someone who was ADHD (28%) or dyslexic (25%) [X2 = 6.74, p < .05]. When asked what they knew about each condition 38% gave an accurate detail about autism, 23% for ADHD and 32% for dyslexia. Performance on the picture task showed overall children said the neurotypical behaviour was more acceptable than the neurodivergent behaviour, but this was only significant for the ADHD (Fishers, p<.01) and dyslexic behaviours (Fishers, p<.05). When asked about friendships, overall a greater percentage of children said they would be friends with the neurotypical child than the neurodivergent child, however this was only significant for the dyslexic behaviour (p<.05).

Conclusions: In comparison to other neurodivergent conditions, neurotypical children know more autistic individuals and have a better understanding of the condition than ADHD or Dyslexia. This greater familiarity may explain why they were more accepting of the neurodivergent behaviour illustrated by the autistic individual, but not the ADHD or Dyslexic individual. In general neurotypical children are more a bit more likely to accept other neurotypical children as friends, although this greater inclination was only significant for the dyslexic condition. Overall, these findings may be explained by the specific behaviour highlighted and the context in which it is expressed.

Objectives: To investigate the specificity of imitation differences for ASD by comparing imitation performances of children with ADHD, ASD and NT development.

Methods: Children (18 ADHD, 57 ASD (36 with comorbid ADHD), 59 NT) completed a 1-minute imitation task, in which they copied the dance-like movements of a video avatar. During this task, children’s movements were tracked using Kinect Xbox cameras. The tracked motion data were compared to avatar’s motion data using the CAMI algorithm, which returns a score ranging from 0 (no imitation) to 1
Results: Bonferroni-corrected tests revealed that children in the ASD group performed poorer imitation (lower CAMI scores) as compared to children in the ADHD (p=0.02) and NT group (p<0.0001), while ADHD and NT groups did not differ from each other (p=0.77; Fig-1A). Across the entire sample, poorer imitation performance was significantly associated with autism-associated social-communicative difficulties as measured by SRS-2 (r=-0.47, p<.0001). Within the ASD group, a multilinear model showed that only ADOS-2 (p=0.001) and Conners inattentiveness scores (p=0.01) significantly predicted lower CAMI scores, while SRS-2 and Conners hyperactivity/impulsivity score were insignificant (Fig-1B). Further, within the ASD group, imitation performance did not differ as a factor of whether the children also had an ADHD diagnosis (p=.77, Fig-1C).

Conclusions: Imitation performance as measured by CAMI reflects autism-specific traits that are not shared by children with ADHD. For ASD children, the severity of their autistic traits (as measured by ADOS-2) and ADHD inattentiveness traits, but not hyperactivity/impulsivity traits, contribute to poorer imitation. We discuss implications of these findings for establishing specificity of motor imitation difficulties in ASD.

Background:

Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD) are two often co-occurring neurodevelopmental conditions. Nevertheless, there is limited research about symptoms differences between ASD and ASD + ADHD groups. Children with ASD + ADHD are diagnosed later than those with only ASD. The lack of knowledge about symptom differences between ASD and ASD + ADHD may lead to incorrect or delayed diagnosis, which leads to delay of adequate interventions. Youth with ASD + ADHD may not get optimal interventions, such as psychoeducation adapted to their specific combination of issues. Increased awareness from clinicians, school personnel and parents of what may be signs of ASD + ADHD is required in order to detect these children earlier.

Objectives:

The objective of this study was to investigate whether there are symptom differences between children and adolescents with ASD and those with ASD + ADHD when using common clinical instruments for measuring ASD symptoms in a larger sample and in naturalistic clinical setting.

Methods:

In total of 112 participants were identified from two clinical trials of social skills intervention for children and adolescents with ASD and co-occurring conditions. Fifty-six children and adolescents with ASD aged 8-17 years were matched for age, gender and general intelligence quotient with fifty-six children and adolescents with ASD + ADHD. Group differences in scores on the Autism Diagnostic Observation Schedule were analyzed.

Results:

Our results showed that participants with ASD and with ASD + ADHD had similar profiles of social communication interaction challenges and restricted behavior. However, items assessing gestures: conventional, instrumental or informational gestures and empathic or emotional gestures showed significant differences between the groups suggesting that the ASD + ADHD group used gestures to communicate more adequately than the ASD group.

Conclusions:

We conclude that children and adolescents with ASD + ADHD have similar qualitative difficulties with social communication and restricted and repetitive behaviors as those with ASD. Our findings may indicate some differences between the groups in the use of
gestures in social situations. The ASD + ADHD group in our sample used gestures more adequately. This could possibly be connected to the lack of inhibitory control from ADHD and result in the impression of livelier body language that could camouflage the presence of ASD. More information on the ASD + ADHD behavioral phenotype may be important in the earlier detection of individuals with ASD + ADHD as well as offering better tailored psychoeducation for this group.

437.332 (Poster) Tactile Sensitivity and Theory of Mind Predict Empathy in Autistic Children  
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Background:
Empathy describes the ability to perceive and understand the feelings and emotional states of others (Decety, 2015). In neurotypical (NT) people, first-hand experience of tactile stimulation and the ability to understand others’ mental states (also known as theory of mind or ToM) both contribute to empathy (Decety, 2015; Decety & Michalska, 2020). Autistic children were described as showing reduced empathy for others’ pain or distress (e.g., Jones et al., 2010; McDonald & Messinger, 2012; Peterson, 2014). Their core autistic symptoms—the difficulties in social interactions, such as challenges in ToM, and atypical sensory profiles, such as hyper- or hypo-sensitivity to tactile and painful stimuli (American Psychiatric Association, 2013), may together weaken the building blocks of empathy during their childhood. However, this hypothesis has not been well examined.

Objectives:
The current study investigated the roles of sensitivity to touch and pain and ToM in predicting empathy in autistic children. We aimed to provide evidence for the potential physio-psychological mechanisms of altered empathy in autistic children.

Methods:
Sixty-six 5- to 7-year-old autistic children and 68 age- and IQ-matched NT children participated in our tests. Trait empathy was assessed using the Griffith Empathy Measure-Parent Ratings (GEM-PR) with affective and cognitive empathy subscales (Dadds et al., 2008; Xiao et al., 2016). The thresholds of touch and pain sensitivity were measured using the Touch Test™ Sensory Evaluators (20-piece kit, Catalog Number 58011; Stoelting Co.). Children’s ToM abilities were measured using the Scaling of Theory-of-Mind (Wellman & Liu, 2004) and the Sally-Ann Task, which was designed to assess the accumulating ToM understandings beyond false belief. Subscores of ToM tasks, including Basic ToM, False Beliefs, and Hidden Emotion, were calculated (Ma et al., 2019; Wellman & Liu, 2004; see Table 1 for details).

Children’s sensitivity to touch and pain stimulation, subscores of the Scaling of Theory-of-Mind, and GEM-PR were compared across the groups using independent sample t- or chi-square tests. Multiple linear regression analyses were performed to examine how the sensitivity to touch and pain and ToM would modulate the affective and cognitive empathy in autistic and NT children.

Results:
We found that (a) compared with NT children, autistic children displayed hypo-sensitivity to tactile stimuli, and got lower scores on subscales of ToM and affective and cognitive subscales of GEM-PR (see Table 1); b) False Beliefs and atypical sensitivity to touch and pain could predict children’s empathy. To be specific, better performance on False Beliefs predicted higher level of affective empathy (see Figure 1a), while hyper- or hypo-sensitivity to touch and pain predicted lower level of cognitive empathy (see Figure 1b).

Conclusions:
Our study indicated how atypical sensory sensitivity and difficulties in ToM influenced empathy in autistic children. These findings advanced our understanding of the potential physio-psychological mechanisms underlying the reduced empathy in autistic children and provided important therapeutic implications. Empathy in autistic children might be elevated along with the tactile training and the social skill interventions focusing on ToM.

437.333 (Poster) Testing the Mechanisms Underpinning the Social Motivation Theory: The Role of Co-Occurring Anxiety  
Background: The Social Motivation Hypothesis proposes that differences in social reward processing underlie autism, by reducing opportunities to develop social-cognitive skills. High levels of social motivation have also been linked to lower anxiety. Given that autism and anxiety often co-occur, an alternative possibility is that unmeasured anxiety symptoms are driving the association between social motivation and autistic traits.

Objectives: The key aims of this study are 1) to test the mechanisms underlying the association between social motivation and autistic traits, specifically whether individual differences in social cognition or anxiety can account for this association; and 2) to examine the evidence for differential, sex-specific effects.

Methods: Participants were 167 adolescents (73 male), aged 10 to 16 years, from the Mapping profiles of cognition, motivation and attention in childhood (C-MAPS) study. Participants were recruited via schools, charities and social media, with targeted recruitment aimed at increasing variability in autistic traits, with 70 participants (37 male) having an autism diagnosis. The C-MAPS study included a battery of online experimental measures of social motivation, and social cognition (theory of mind, ToM; emotion recognition), as well as parent-reported measures of trait anxiety from the Spence Children’s Anxiety Scale and autistic traits from the Social Responsiveness Scale.

Results: Social motivation was significantly associated with autistic traits ($\beta = -.26, p < .001$), such that participants with higher autistic traits scored lower on our experimental measure of social motivation. Controlling for social cognition (ToM and emotion recognition) did not reduce the association between social motivation and autistic traits in the overall sample. Controlling for anxiety, however, did significantly reduce the strength of the association (change in $\beta$: $t = 5.45, p < .001$). Analyses split by sex showed a significant association between social motivation and autistic traits only in the females ($\beta = -.37, p < .001$) not males ($\beta = -.04, p = .74$), and the attenuation of the association by anxiety was again specific to females (see Figure 1).

Conclusions: Contrary to mechanisms proposed by the Social Motivation Hypothesis, social cognition differences did not explain the association between social motivation and autistic traits. This consistent with self-report by many autistic individuals who do not identify as having reduced social motivation. The association between social motivation and autistic traits was attenuated, however, when accounting for co-occurring anxiety. This suggests the reduced social motivation seen in autism may in fact be due to unmeasured, co-occurring anxiety. Increased social motivation may also result in the reduction of certain autistic behaviours, for example self-soothing behaviours, via lower social anxiety in social situations (Swain et al., 2015). The differential sex effects, showing associations only in females, may be due to environmental factors such as increased social demands in adolescent female relationships or gendered parenting encouraging reciprocal social interactions, which may selectively increase opportunities to build confidence in socially motivated females, reducing the use of RRBs to self-soothe. Future longitudinal studies are needed to tease apart the temporal ordering of effects and test the underlying mechanisms developmentally.

437.334  (Poster) The Choice of Stimuli Matters – Meta-Analysis of Emotion Recognition from Dynamic Faces in ASD
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Background: Individuals with ASD have difficulties recognizing emotion from faces, which affect everyday social functioning (Trevisan & Birmingham, 2016, Res Autism Spectr Disord). Although human faces are highly dynamic in the real world, static face stimuli (e.g., images) are still most common for testing emotion recognition in ASD (Yeung, 2021, Neurosci Biobehav Rev). Using dynamic stimuli (e.g., natural videos) might change our understanding of the ASD difficulties. On the one hand, additional motion information improves emotion recognition in non-ASD individuals (Lander & Butcher, 2015, Front Psychol). On the other hand, ASD individuals show aberrant perception of biological motion, particularly when emotional signals are conveyed (Federici et al., 2020, Sci Rep; Todorova et al., 2019, Mol Autism) and the dynamics of facial stimuli can modulate emotion processing in ASD (Tardif et al., 2007, J Autism Dev Disord; Sato et al., 2013, Res Autism Spectr Disord). Thus, it is unknown whether the choice of stimuli between dynamic and static faces might influence the assessment of emotion recognition difficulties in ASD compared to non-ASD.

Objectives: We aimed to systematically evaluate the evidence on emotion recognition in ASD using a meta-analytic approach. We did it separately for studies that applied dynamic faces and static faces. We expected that effect sizes for group differences between ASD and non-ASD individuals would be different between the two approaches.

Methods: We conducted a systematic review of studies investigating emotion recognition in ASD compared to non-ASD according to PRISMA guidelines (Moher et al., 2009, Ann Intern Med). We included studies that provided measures of behavioral recognition accuracy and/or response times and classified them according to the face stimuli (dynamic vs. static). We performed a formal meta-analysis using multilevel random-effects modeling to compute mean-effect sizes of group differences between ASD and non-ASD individuals. We accounted for methodological factors (e.g., sample characteristics, stimuli and response format). Currently, we are assessing the quality of study designs and reporting to control for its confounding effects in our models. When feasible, we will compute estimations for specific emotions.
Results: Our search identified 317 studies on facial emotion recognition in ASD, from which 34 studies with dynamic faces and 118 studies with static faces fulfilled our criteria for inclusion. We are still in the process of data analysis and can currently provide only preliminary results. ASD compared to non-ASD individuals showed reduced performance in emotion recognition. We found comparable mean-effect sizes between studies with dynamic and static faces. These effects generalize across age groups, sex and IQ. Methodological factors linked to stimulus and response format significantly modulate the effects.

Conclusions: Our work will make two contributions. First, it will give a comprehensive overview of the current state of evidence on facial emotion recognition in ASD, and quantify the extent of the behavioral difficulties when using dynamic compared to static stimuli. Second, it will allow for practical implications for future studies to improve the reliability and ecological validity of emotion research in ASD.

437.335 (Poster) The ClaCoS Battery in Complex Diagnoses of Women with ASD

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Background: Autism Spectrum Disorder (ASD) is characterized by impairments in social communication and interaction and limited interests and repetitive behaviour. These social communication impairments are not well characterized, due to a lack of standardized evaluation tools, especially in adult or female individuals. Gender differences in autism remain debated. The concepts of “camouflage”, compensations or gender-related phenotypes need to be better defined and understood (Lai et al, 2017). Nevertheless women with ASD (without intellectual disability) show better social communication skills (Lai et al, 2015) in adulthood and could be under-diagnosed or recognized later than men. The multicentric research group in psychiatry GDR3557 (Institut de Psychiatrie) developed a new battery for social cognition evaluation named ClaCoS which considered social cognition as a multidimensional process, and examined four components of social cognition: Emotion Recognition, Theory of Mind, Attributional Style and Social Perception and Knowledge. It also provides an assessment of subjective complaints in social cognition.

Objectives:

To assess the relevance of the ClaCoS battery in the evaluation of social cognition impairments in ASD adults and especially in women, who show more subtle clinical symptoms.

Methods:

We examined sex differences in a population of 37 ASD adults without intellectual disability (26 men and 11 women), on ClaCoS and on classical tools used for ASD diagnosis (ADOS and ADI-R). We further compared the social cognition abilities of these 37 ASD adults and 37 neurotypically developed volunteers using ClaCoS.

Results:

The ASD group showed deficits in all four components of social cognition and reported greater subjective complaints regarding their social abilities. Social communication and interaction deficits in ASD adults were less visible in female compared to males on the ADOS, although they showed typical clinical symptoms in childhood, when assessed with the ADI-R. No differences were observed between male and female ASD adults assessed with the ClaCoS.

Conclusions:

The ClaCoS battery is an interesting functional tool allowing to assess social impairments in ASD adults. It provides complementary information to classical tools used in the diagnostic procedure, which are not always sensitive to social communication deficits in ASD adults without intellectual disability, especially in women (Lai et al, 2011). This new battery may thus be useful in these complex diagnoses of women with ASD. Moreover, it allows to specify the altered components, for a better adjustment of tailored social cognition training programs.
**437.336 (Poster) The Different Phenotypes of Social Functioning in Adolescents and Young Adults with ASD: An Exploratory Study Using Multi-Method Approach**

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**Background:**
Autism spectrum disorder (ASD) is characterized by difficulties in social interaction and communication. Moreover, deficits in social functioning and social skills can lead to lower social participation and higher isolation that are associated with broad negative consequences and poor long-term outcomes. However, the notion of spectrum reflects a heterogeneity of these difficulties, both in the severity of autistic symptoms and in their expression. In addition, numerous psychiatric comorbidities are likely to influence the expression of autistic symptoms. These comorbidities (ADHD, depression or PTSD) can hinder social integration and negatively impact the effectiveness of therapeutic interventions. Surprisingly, only a few studies have attempted to better understand this heterogeneity by defining more homogeneous subgroups of social functioning in individuals with ASD. These studies have shown variable profiles of social withdrawal and social appropriateness but without necessarily considering these aspects of psychiatric comorbidities.

**Objectives:**
This study aims to provide a better understanding of the different social phenotypes in a sample of verbally fluent adolescents and young adults with ASD. As static measures do not provide an integral view of social functioning, which is highly context-dependent, a combination of measures will be evaluated. In particular, the ESM, a structured diary technique that collects real-life measures in the context of daily life, will be used in combination with a parent-reported questionnaire and direct observation to obtain a detailed characterization of social functioning.

**Methods:**
55 adolescents and young adults with ASD and the same number of typically developing (TD) individuals aged 12 to 25 years have already been collected. Participants are required to complete the ESM protocol which measures the frequency and subjective evaluation of social interactions. In addition, the SRS is used to assess social appropriateness and social motivation. Finally, the SSPA, a direct observation of participants during role plays will be used to quantify social appropriateness. A latent profile analysis will be used. To identify the influence of psychiatric comorbidities on the different phenotypes of social functioning, the SIAS, ASR/YSR and ABCL/CBCL scores will be considered using a multiple linear regression. Note that these analyses were subject to pre-registration.

**Results:**
We expect that participants with ASD will be characterized by heterogeneous social functioning impairments, whereas TD will have a more homogeneous profile. We hypothesize that TD individuals will be in majority rallied in the same profile characterized by good social functioning. Concerning participants with ASD, we hypothesize they will be clustered in 4 subgroups. Therefore, different profiles should emerge according to the social motivation, evaluation of daily social interactions, and social appropriateness. Finally, different rates of psychiatric comorbidities are expected in the different subgroups.

**Conclusions:**
The purpose of this study is to better characterize the different social functioning profiles in ASD. It would allow to better target therapeutic interventions according to the different phenotypes of social functioning and their associated comorbidities. Moreover, as social functioning is a complex concept, this methodology could provide new information on the aspects of social functioning that are impaired/preserved in this population according to the different phenotypes.

**437.337 (Poster) The Factor Structure of the Camouflaging Autistic Traits Questionnaire (CAT-Q) and Predictors of Camouflaging in a Representative General Population Sample**

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**Background:** “Camouflaging” broadly refers to the use of coping strategies by autistic people to minimize autistic visibility, such as suppressing autistic behaviours, imitating neurotypical peers during interactions, or preparing social scripts. A key unanswered question is the extent to which camouflaging is in fact a ubiquitous coping experience during interpersonal life across neurotypes in the general population.
Objectives: We aimed to investigate the factor structure and theory-driven (Ai et al., 2022) motivational and cognitive predictors of self-reported camouflaging across the general population, and to unveil whether findings echo what has been learned in autistic people. This study establishes an important foothold in tackling the conceptual clarity of camouflaging research.

Methods: Participants included 972 adults from a representative U.S. general population sample (461 men, 491 women, 20 gender-diverse, Mage = 44.2 yrs, 72.7% Caucasian, 7.51% neuro-diverse). Participants completed an online survey consisting of construct measures spanning impression management (i.e., camouflaging and self-presentation), cognitive skills (i.e., executive functions, emotion regulation), social motivations (i.e., internalized stigma, public self-consciousness), and neurodivergent traits (i.e., ADHD and autistic traits). Exploratory Item Factor Analysis (EIFA) was used to identify the factor structure of the Camouflaging Autistic Traits Questionnaire (CAT-Q) in the general population. Hierarchical regression models were used to assess demographic/individual trait predictors of CAT-Q. Regularized regression models were performed to identify social-motivational and cognitive predictors of CAT-Q.

Results: The EIFA fit indices support a four-factor structure of the CAT-Q (RMSEA = .046). The item distribution (see Table 1) largely reflects the originally reported three-factor CAT-Q structure in autism-enriched samples. Hence, the four factors were interpreted as Compensation (7 items), Masking (8 items), Active Assimilation (5 items), and Passive Assimilation (4 items). A large positive correlation was found between the CAT-Q and the Self-Presentation Tactics (SPT) scale (r = .60). Hierarchical regression revealed that men showed higher CAT-Q scores than women in the general population (partial r² = .008, p = .006); as well, increased ADHD and autistic traits both predicted increased CAT-Q scores (partial r² = .069, p < .001 and partial r² = .048, p < .001, respectively). The elastic-net regression model showed that, in addition to neurodivergent traits, higher CAT-Q scores were predicted by greater social comparison tendency, greater public self-consciousness, greater perceived self-other closeness, greater emotion regulation, greater internalized stigma, greater social anxiety, greater inhibition skills, and lower cognitive flexibility.

Conclusions: Camouflaging seems to be a shared social coping experience across neurotypes in the general population. This view is further supported by the strong positive correlation between the measurements of camouflaging and self-presentation (an established impression management construct). The findings also yield insights on key social-motivational and cognitive predictors of camouflaging in the general population (see Figure 1), which should be evaluated to complement the growing research on autistic camouflaging. This general-population-based study advances a more psychometrically grounded understanding of camouflaging that may guide more precise research directions on camouflaging and its drivers across neurotypes.


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Background: Despite of the dissociation between cognitive and affective empathy in children with high-functioning autism spectrum disorder (ASD), the associations of cognitive and affective empathy with altruistic behaviors remained unclear.

Objectives: To compare the cognitive and affective empathy and explore their association with altruistic behaviors in children with high-functioning ASD.

Methods: We conducted an eye-tracking experiment using a modified paradigm of dictator game (DG) to reveal altruistic behaviors with the components of facial expression (happy, sad and neutral faces). We recorded the affective empathy response via the pupillary responses during automatic emotional contagion, and evaluated the cognitive empathy through self-reported degree of empathy after experiments. Fifty children with high-functioning ASD, and 50 age-, sex- and intelligence-matched typical-developing (TD) controls were analyzed. Repeated measured ANOVA, Generalized Linear Model(GLM) and Generalized Additive Mixed Model (GAMM) were used to statistical analyze.

Results: The results revealed no differences regarding eye scanning patterns, facial expression recognition and cognitive empathy response during the experiments between the two groups whatever which kind of facial emotion. However, affective empathy which was reflected by pupillary responses during automatic emotional contagion were stronger in autistic children on negative emotion processing (i.e., sad faces). Moreover, cognitive empathy response was positively associated with the altruistic decision in children with ASD.

Conclusions: Our findings shed light on the imbalance in affective and cognitive empathy in high-functioning ASD, and cognitive instead of affective empathy might play a more important role on altruistic behavior.

437.339 (Poster) The Impact of Gender on Autism Symptom Severity and Problem Behaviors

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**Background:** Children with autism spectrum disorder (ASD) display a diverse range of symptom criteria and severity. Several gender differences in ASD have been noted, with boys and girls demonstrating differential symptom presentations and impairments (Mandy et al., 2012). Furthermore, children with ASD often have difficulties with overregulated or underregulated challenging behaviors, many of which become impairing for the child’s functioning in a variety of domains (Parternite et al., 2009; Vaillancourt et al., 2016). Given the relevance of early life development and ASD symptom severity it is incredibly important to investigate their relation to problem behaviors. Furthermore, research is needed examining the influence gender has on this relation.

**Objectives:** The current research study investigated the association between ASD symptom severity, problem behaviors, and gender within children aged 5-10 years old with ASD. Specifically, it examined how gender impacts the relation between symptom severity and problem behaviors.

**Methods:** This study utilized cross-sectional data from a larger web-based survey investigating children with ASD. Participants included 36 parents of children with ASD aged 5-10 years old living in the United States (M = 7.03, SD = 1.46). A majority of children reported on were White (66.66%) and male (66.67%). Our model consisted of a predictor of ASD symptom severity, an outcome of total problem behaviors, and a moderator of gender. Symptom severity was measured by a composite score of the Stereotyped, Change, Social, and Understanding subscales in the Children’s Social Behavior Questionnaire (CSBQ; de Bildt et al., 2009; Hartman et al., 2006). Problem behaviors were measured by a composite score on the Nisonger Child Behavior Rating Form- parent (NCBRF; Aman et al., 1996). The CSBQ and NCBRF are both parent report measures and have been validated for children aged 5-10 years old with ASD (Hartman et al., 2006; Lecavalier et al., 2004).

**Results:** A multiple regression analysis was conducted using base R (R-4.2.1.tar.gz) to predict total problem behaviors from the interacting effects of ASD symptom severity and gender. Results supported a statistically significant interaction effect between symptom severity and gender that accounted for 41% of the variance in problem behaviors (F(3,31) = 7.21, p<.001). Probing the interaction effect with Johnson-Neyman and pick-a-point approaches indicated the relation between symptom severity and problem behaviors is significant for males, but is non-significant for females. See figure 1 for more details.

**Conclusions:** Our results indicated that gender moderates the relation between symptom severity and problem behaviors. As symptom severity increases for boys, they display greater problem behaviors. This association was not significant for girls, indicating no differences in problem behaviors as their symptom severity increases. This, in concordance with previous literature examining the relation between symptom severity and problem behaviors among school-aged children, provides a nuanced look into the differential impact of gender (Jang et al., 2011). Future studies should further investigate the impact of gender and symptom severity on problem behaviors, taking a closer look into gender difference differences.

**437.340 (Poster) The Impact of Social History and Social Motivation on Neurodivergent Adolescents’ Interpretation of Social Transgressions.**  
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**Background:** Friendships provide important context for learning social skills and problem solving, and protect against peer victimization (Bollmer et al., 2005; Hodges et al., 1999). Neurodivergent (ND) youth (i.e., autistic or ADHD) may experience differences in friendship quality or durability compared to neurotypical (NT) peers (Mendelson et al., 2016; Petrina et al., 2016), likely reflecting distinct social communication preferences for ND vs NT youth (Milton, 2012). Additionally, past or current social experiences may impact ND youth’s perceptions of peer interactions (Romanczyk et al., 2005; van Roekel et al., 2010). The combined impact of NT social competence and social experiences may further contribute to ND adolescents’ perceptions of social transgressions and friendship experiences.

**Objectives:** To explore the impact of social competence and social experiences on ND adolescents’ perception of friendship transgressions.

**Methods:** Self- and parent-report questionnaire were completed for 82 adolescents (ages 11-21) with verbal expressive language and diagnoses of ASD and/or ADHD. Social experiences were measured by the Friendship Quality Questionnaire (FQQ; Parker & Asher, 1993) and the Assessment of Bullying Experiences (ABE; Morton et al., 2021). Neurotypical social competence was assessed using The Social Responsiveness Survey, Second Edition (SRS-2; Constantino et al., 2012). The adapted Friendship Transgression Stories (Bottema-Beutel, Malloy, Cuda, Kim, & MacEvoy, 2019) was used to measure adolescents’ interpretation of severity of friendship transgressions in vignette format. A linear regression was conducted to examine to multivariate associations of social competence (motivation, awareness, cognition, and communication) peer victimization, and friendship quality on perceived severity of friendship transgressions.

**Results:** Friendship transgressions were perceived as more severe by youth with higher quality friendships (β=0.40, SE=0.18, p=0.038), a less neurodivergent style of social motivation (β=-0.03, SE=-0.02, p=0.026), and who were younger (β=-0.15, SE=0.05, p=0.011). Nonsignificant predictors included number of friends, gender, bullying history, social awareness, social cognition and social communication.
Conclusions: Consistent with Romanczyk et al. (2005)’s proposed model of social competence, it appears that certain social experiences may provide important context into the way in which social interactions are understood and navigated by ND adolescents. ND adolescents who report greater quality friendships and who are more motivated for social interactions interpret transgressions as more severe. In contrast to prior literature, previous or current bullying did not impact the interpretation of transgressions (van Roekel et al., 2010). Perhaps adolescents who are more motivated to form social relationships are more likely to overlook transgressions. Alternatively, adolescents who are older and have higher social motivation may have had a greater number of social experiences which have shaped the way in which they interpret transgressions. Findings highlight the importance of intervening on social experiences of ND youth early on, as these experiences may shape skills needed for navigating social experiences later on.

437.341 (Poster) The Integration of Head and Body Cues during the Perception of Social Interactions
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Background: Although humans spend a large proportion of time participating in social interactions, little is known about the processes underlying their visual recognition. Directional information from a person’s eyes, head, and body are integrated to inform where another person is looking and who they are interacting with. Individuals with Autism Spectrum Conditions (ASC) have shown differences in social cue integration when viewing images of isolated individuals. However, to date, social cue integration research has focused largely on the perception of isolated individuals, and the nature and extent of cue integration during interaction perception in autistic and non-autistic individuals is relatively unknown.

Objectives: We investigated whether observers integrate directional cues from the body with head orientation information when judging whether two people are interacting, and whether this integration is affected by autistic traits, frame of reference, and eye-region visibility.

Methods: Across two experiments, N = 230 participants judged whether dyads were interacting using well-controlled, computer-generated stimuli that systematically varied in head and body orientation. Additionally, we manipulated the frame of reference of the stimuli (egocentric: one of the interactants faced the observer vs. allocentric: interactant turned away from the observer) and the eye-region visibility of the dyads.

Results: Results demonstrate that individuals integrate information from the body with head information when perceiving dyadic interactions, such that perceived interaction is shifted away from the orientation of the body when head and body cues are misaligned. Additionally, our findings suggest that autistic traits affect social cue integration during interaction perception, but that these effects are dependent on the frame of reference and the eye-region visibility of the dyads. Specifically, individuals reporting more autistic traits were influenced more strongly by the directional cue of the body during interaction perception than those reporting fewer autistic traits, but only when the eye-regions of the dyads were visible in an egocentric frame of reference.

Conclusions: Everyday social interactions involve rapid integration of directional cues from the head and body of others. Our data demonstrate how autistic traits influence this integration. This result points to potential sensory mechanisms underpinning some of the social behavioural challenges experienced by many autistic individuals. Future research can focus on the generalisability of these results with non-social stimuli, as well as in clinically diagnosed populations.

437.342 (Poster) The Mediating Effect of Camouflaging and the Moderating Effect of Autistic Identity on the Relationship between Autistic Traits and Mental Wellbeing
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Background:
Camouflaging (or behaving differently in order to fit in) is common among autistic adults. Mental health difficulties are also prevalent, including anxiety and depression, and research has demonstrated correlations between camouflaging and these mental health difficulties. However, no research to date has explored the mediating effect of types of camouflaging behaviour on the relationship between autistic traits and mental health. Neither has it considered whether a positive autistic identity might offer a protective effect. Furthermore, very little research has investigated positive wellbeing.

Objectives:
To explore the mediating effect of different camouflaging types and the moderating effect of autistic identity on the relationship between autistic traits and mental wellbeing.
Methods:

Data were collected for 464 autistic adults, recruited through volunteer databases and social media. Among other measures relevant to the wider study, participants completed measures of autistic traits (Autism Quotient-10; AQ-10), anxiety and depression (Hospital Anxiety and Depression Scale; HADS-A and HADS-D), positive wellbeing (Warwick-Edinburgh Mental Wellbeing Scale; WEMWBS), camouflaging (Camouflaging Autistic Traits Questionnaire; CAT-Q), and autistic identity (Autism Spectrum Identity Scale; ASIS). Moderated mediation models were run using model 8 of Hayes’ (2013) PROCESS macro for SPSS, applying bootstrapped 95% confidence intervals (10,000 resamples). CAT-Q was mediator, and ASIS moderator on the direct and indirect (AQ-10àCAT-Q) relationships. Age and gender were included as covariates. Where moderators were not significant, simpler models were reported (model 4, parallel mediation).

Results:

There was no moderating effect of autistic identity on any direct (HADS-A: F(1,441)=.52, p=.4724; HADS-D: F(1,441)=.33, p=.5667; WEMWBS: F(1,435)=1.83, p=.1766) or indirect effects (see Table 1). Reverting to model 4, there was no significant direct effect for AQ-10 to: HADS-A (B=0.2280, SE=.1227, Cls=-.0130, .4690); HADS-D (B=.0298, SE=.1310, Cls= -.2276, .2872); or WEMWBS (B=.4114, SE=.2625, Cls=.1045, .9273). For HADS-A and HADS-D, there was a significant indirect effect through CAT-Q Assimilation only; whereas for WEMWBS, both CAT-Q Compensation and CAT-Q Assimilation were significant (see Table 1).

Conclusions:

Autistic identity does not impact the relationship between autistic traits and mental health, directly or through camouflaging. The impact of external identity threat (e.g. stigma) may have a greater role and should be considered in future, to explore the role of external pressures on camouflaging and mental health in autistic individuals. Full mediation was found; the relationship between autistic traits and mental health was significant through its effect on camouflaging. Different types of camouflaging played different roles in the relationship for each mental health measure, signifying that tailored support is needed. However, common to all was the mediating effect of assimilation, suggesting a general target for mental health support.

437.343 (Poster) The Relationship between ADHD Symptoms and Looking Patterns in Children with ASD: Results from the Autism Biomarkers Consortium for Clinical Trials (ABC-CT)

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Background: Previous literature reports high co-occurring rates of attention deficit/hyperactivity disorder (ADHD) in individuals with autism spectrum disorder (ASD), resulting in greater social, adaptive, and cognitive challenges. In ASD and in ADHD, social visual attention represents a possible shared pathway of underlying mechanisms. Therefore, it is important to understand how ADHD influences social motivation and social preference in ASD, better informing future interventions.

Objectives: To examine the relationship between ADHD symptomatology and social attention among autistic children.

Methods: Data was collected across five sites from 271 autistic children ages 6-11 (206 males; age M=8.57±1.64; FSIQ M=96.92±17.91) as part of the Autism Biomarkers Consortium for Clinical Trials (ABC-CT). Using the SR EyeLink 1000+, participants were shown full-color circular arrays of 5 static images: face with direct gaze, scrambled face, bird, mobile phone, and car. Stimuli were equidistant from the center of the screen and were comparable in size and color. Participants were presented with six 20-second trials. Latency to fixate to each object was calculated as the time when the gaze first entered the pre-defined region of the object. Percent looking was calculated as the number of valid gazes to the object divided by the total number of onscreen gaze samples, and total looking time was calculated as time spent looking at the object divided by the total presentation time. The Child and Adolescent Symptom Inventory, Fifth Edition (CASI-5) was administered to obtain parent-reported symptoms of inattention and hyperactivity. Correlations were used to determine associations between ADHD symptoms (CASI-5 Inattentive subscale and Hyperactive-Impulsive subscale T scores), latency, percent looking, and average looking time during the visual search paradigm.

Results: Inattentive and hyperactive-impulsive symptoms were positively correlated with the latency of the first look at faces (r=0.14, p<0.03 for inattentive symptoms; r=0.15, p<0.02 for hyperactive-impulsive symptoms), but not to nonsocial objects (r=-0.06, p=0.36; r=-0.11, p=0.06, respectively). Inattention was negatively correlated with percent looking at faces (r=-0.17, p<0.01) and average looking time (r=-0.15, p<0.02), but hyperactivity was not (r=-0.09, p=0.15; r=-0.09, p=0.13 respectively). Percent looking to nonsocial objects
increased with greater ADHD symptoms \( r=0.14, p<0.03 \) for inattentive symptoms; \( r=0.15, p<0.02 \) for hyperactive-impulsive symptoms). Average looking time to nonsocial objects was also positively correlated with higher ADHD symptoms \( r=0.13, p=0.04 \) for both inattentive and hyperactive symptoms).

Conclusions: These findings indicate a relationship between ADHD symptomatology and looking patterns towards nonsocial objects in autistic children. Higher ADHD symptoms were associated with greater latency to faces, and higher inattentive symptoms were associated with reduced looking to faces. These findings, combined with previous findings, suggest that individuals with ASD and ADHD experience greater difficulties when looking to faces compared to individuals with ASD or ADHD alone, suggesting an interactive effect in which ADHD exacerbates social visual attention difficulties in ASD. Future work is needed to understand if looking patterns towards social and nonsocial stimuli are influenced by motivational or attentional differences. Elucidating the underlying mechanisms of ASD and ADHD through future eye-tracking studies will inform the impacts of ADHD on ASD symptomatology.

**437.344 (Poster) The Relationship of Child Mental Health Indicators and Pragmatic Communication Domains over Time**

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**Background:** A hallmark feature of Autism Spectrum Disorder (ASD) is impairment in pragmatic (e.g. social communication) skills which fully develop in middle childhood. Children with ASD are at an elevated risk of developing co-occurring psychological disorders complicated by both internalizing and externalizing behaviors. Pragmatic impairments are associated with increased mental health risks, including externalizing (i.e. hyperactivity/aggression) and internalizing conditions (e.g., anxiety) (Boonen et al., 2014; Rodas, Eisenhower & Blacher, 2017). For verbally fluent children, communicative impairments may lead to greater difficulty navigating social interactions, contributing to elevated anxiety. Greater externalizing behaviors has also been reported in ASD compared to peers and may contribute to peer rejection. Clarifying the relationship between pragmatics and psychological outcomes in middle childhood has potential to inform risks and potential untapped intervention targets during this critical period for social development.

**Objectives:** 1) To investigate the relationship between parent-rated internalizing and externalizing symptoms and child pragmatic language at two distinct time points in a sample of verbally fluent children with autism. 2) Test the predictive power of child pragmatics at baseline on child mental health indicators over time.

**Methods:** A sample of 51 children with confirmed ASD (74.5 % M) aged 7-12 years (m=9.86, SD=1.24) were included. Participants were enrolled in a 12-week randomized controlled trial (clinicaltrials.gov: NCT01190917); data were collapsed across conditions for this analysis. Child pragmatics were measured using the pragmatic domains of the Child’s Communication Checklist-2 (CCC-2; Bishop, 2006). Child mental health indicators were taken from the Behavior Assessment System for Children-2 (BASC-2), including internalizing and externalizing symptoms.

**Results:** Pearson’s correlations were conducted at baseline and week 12 to examine the relationship of child internalizing/externalizing symptoms and child pragmatic skills at each time point. Findings support significant relationships at baseline and week 12 (Table 2). However, parent rating of Depression was only correlated with child pragmatic domains at baseline, and parent rating of Anxiety was not significant with pragmatic domains at either time point.

The Externalizing Domain emerged as a primary variable of interest. A linear step-wise regression was conducted to predict Externalizing Behaviors at week 12 from child pragmatic domains at baseline. The model was significant, controlling for intervention group status and IQ, \( F(8, 32)= 4.96, p=.001 \) and accounted for 42.3% of the variance.

**Conclusions:** Externalizing behaviors, and, to a lesser extent, Internalizing behaviors were correlated with child pragmatic skills but the relationship appears to change over time. Children with higher rates of externalizing problems tended to use more inappropriate topic initiations and speak more about their areas of interests. Pragmatic deficits may be exacerbated by symptoms such as poor impulse control and attention difficulties. Depression emerged as an internalizing symptom associated with pragmatics only at baseline, which may suggest gains in social skills over the course of the intervention reduced the relationship of child pragmatics and depression symptoms. Future work could leverage these data to understand potential pragmatic language mechanisms in common psychiatric co-occurring conditions and intervention outcomes for school-aged autistic children.

**437.345 (Poster) The Relationships between Executive Function and Social Interaction in Children with Autism Spectrum Disorder**

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Background: Children with autism spectrum disorder (ASD) are characterized by deficits in social interaction, which may be related to their impaired executive function (EF). EF is viewed as a set of higher-order cognitions for goal-directed behaviors that includes cognitive components such as inhibition, shifting, and working memory. Similarly, social interaction can be viewed as containing dimensions such as social cognition and social communication. Even though numerous studies have investigated the role of EF in social interaction in children with ASD, the elaborate relationships among these EF cognitive components and social interaction remain unclear.

Objectives: This study aimed to examine the profiles of EF and social interaction in children with ASD from caregivers' viewpoints and to investigate the relationships among EF cognitive components and social interaction aspects in children with ASD.

Methods: A total of thirty-nine children with ASD aged 3 to 10 years and their caregivers were enrolled in this study. Caregivers completed the Behavior Rating Inventory of Executive Functioning, Version 2 (BRIEF-2) Parent Form and the Social Responsiveness Scale (SRS-2) as measures of EF and social interaction, respectively. The BRIEF-2 provides three indexes: behavior regulation index (BRI) (i.e., inhibition and self-monitoring), emotional recognition index (ERI) (i.e., shift and emotional control), and cognitive regulation index (CRI) (i.e., working memory, initiating, planning, task-monitoring, and organization of materials). The SRS-2 has four subscales of social interaction: social awareness, social cognition, social communication, and social motivation. The correlations between the BRIEF-2 indexes and SRS-2 subscale scores were examined with Pearson's correlation coefficients and linear regression models.

Results: This study included 18 preschool and 21 school-aged children with ASD (mean = 71 months, SD = 21.58). The correlational results indicated that the SRS-2 subscale scores of social awareness, social cognition, and social communication were significantly associated with the three indexes of the BRIEF-2 ($r = 0.432$~$0.617$, $p < 0.05$). The social motivation subscale had significant correlations with the BRI and ERI ($r = 0.395$ and $0.400$, $p < 0.05$). In addition, the results showed the BRI to be a predictor of the SRS-2 subscale scores of social awareness, social cognition, and social communication ($F = 7.521$, 7.736, 5.131, $p < 0.05$, respectively). The CRI was a predictor of the social motivation subscale score ($F = 3.884$, $p < 0.05$).

Conclusions: This study shows that EF cognitive components are related to different dimensions of social interaction in children with ASD. Behavior regulation (i.e., inhibition and self-monitoring) can predict social awareness, social cognition, and social communication. Cognitive regulation (i.e., working memory, initiating, planning, task-monitoring, and organization of materials) is a predictor of social motivation. This study provides clinicians and researchers with further understanding of the respective relationships among EF cognitive components and different social interaction dimensions. Interventions targeting EF cognitive components can be planned to improve the social interaction of children with ASD.

437.346 (Poster) The Reliability and Validity of the Camouflaging Autistic Trait Questionnaire (CAT-Q) Chinese Version Among Autistic and Neurotypical Adolescents

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Background:

Camouflaging is a coping strategy reportedly used by neurodivergent individuals to fit in in neurotypical contexts. The Camouflaging Autistic Traits Questionnaire (CAT-Q), a self-reported instrument, has been validated in adults in some English-speaking Western societies, but not in other cultural-ethnic groups nor in younger individuals.

Objectives:

The aim of this study is to translate CAT-Q into traditional Chinese and to validate the use of it in non-Western adolescents via both self-report and caregiver-report.

Methods:

We enrolled Taiwanese autistic (n=100) and neurotypical (n=105) adolescents (aged 12-18 years) and their caregivers to complete the Chinese version of CAT-Q (CAT-Q-Ch) and Perceived Stress Scale (PSS-14). Exploratory factor analysis was done to evaluate factor structure of CAT-Q-Ch. Internal consistency and test-retest reliability were measured by Cronbach’s $\alpha$ and intra-class coefficients, respectively. The correlation between adolescent-reported and caregiver-reported CAT-Q-Ch, and between CAT-Q-Ch and adolescent-reported PSS-14 were assessed.

Results:
Exploratory factor analysis suggested a 2-factor structure (compensation-masking and assimilation). Cronbach’s α were 0.887, 0.906, and 0.829 for adolescent self-report CAT-Q-Ch total score, compensation-masking, and assimilation subscale respectively, and 0.853, 0.893, and 0.850 for caregiver-reported CAT-Q-Ch. The intraclass correlation coefficients for each subscale were all above 0.85. Caregiver-reported CAT-Q-Ch had good reliability and highly correlated with adolescent self-report version, and both version were correlated with adolescent reported PSS-14. Autistic adolescents had higher total CAT-Q-Ch scores than neurotypical adolescents (88.3 ± 23.8 vs 77.2 ± 21.1, p = 0.001), especially on both adolescent and caregiver reported assimilation subscale (30.9 ± 9.6 vs 24.3 ± 8.5, p<0.001, and 32.4 ± 8.3 vs 19.5 ± 6.9, p<0.001, respectively). Female autistic adolescents had higher assimilation subscales than male autistic adolescents (34.7 ± 10.2 vs 29.4 ± 8.9, p=0.011), but there was no significant gender difference in other subscales of CAT-Q-Ch in either autistic or neurotypical group. The PSS-14 score was higher in the autistic group (31 ± 9.1 vs 27.7 ± 8.9, p=0.01) and female group (31.3 ± 10.5 vs 28.3 ± 8.2, p=0.044). Autistic female had higher PSS-14 score (36.7 ± 9.6) than both autistic male (28.6 ± 7.9, p=0.01) and neurotypical female (27.2 ± 9.4, p=0.001). Both adolescent self-reported and caregiver-reported CAT-Q-Ch were correlated with adolescent reported PSS-14 score in both ASD group and neurotypical group.

Conclusions:

We found both self-report and caregiver-reported CAT-Q-Ch were reliable for Taiwanese adolescent whose autism diagnosis were made before their adolescence, and had correlation with PSS-14. Our study showed CAT-Q-Ch could be a useful tool for evaluating social coping behavior in autistic and neurotypical adolescents in non-Western countries.

**437.347 (Poster)** The Role of Alexithymia in Explaining the Relationship between Autistic Traits and Cardiac Autonomic Activity during Social Cognition.

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**Background:**

Alexithymia is a personality trait characterised by subclinical difficulty in identifying and describing feelings and is common among autistic adults. The presence of alexithymia may account for individual differences in emotion processing abnormalities that are observed in autism spectrum disorder (ASD), an idea which has become known as the “alexithymia hypothesis”. Respiratory sinus arrhythmia (RSA) is a measure of autonomic nervous system adaptability and is important in regulating emotional processing. Studies of RSA in ASD have provided inconsistent results. This variability might be explained by co-occurring alexithymia. Furthermore, most previous studies have examined RSA at rest, without assessing how RSA reacts to emotional stimuli. This is important because differences may only emerge during disorder-relevant stimuli. This is important because differences may only emerge during disorder-relevant stimuli.

**Objectives:**

To examine the mediating role of alexithymia in the relationship between autistic traits and cardiac autonomic activity at rest and in response to emotional stimuli.

**Methods:**

Participants were recruited from the general population using snowball sampling via social media and advertisements (N = 42; 12 males, 30 females, M_age = 25.54(5.99)). Autistic traits were measured using the Autism Spectrum Quotient (AQ) and alexithymia was measured using the Toronto Alexithymia Scale (TAS20). Physiological data (ECG and respiratory effort) was collected using a MP36R Biopac system with AcqKnowledge 5.0 software. Data was acquired while participants were at rest (5 minutes) and while they performed the Reading the Mind in the Eyes task (RMET). RSA was computed using the AcqKnowledge automated function for RSA analysis. Baseline RSA was calculated as the average RSA values during the five-minute rest period. RSA reactivity was calculated as the average RSA values during the RMET – baseline RSA.

**Results:**

Autistic traits were significantly positively associated with alexithymia (r(42) = 0.558; p<0.001) and both RSA baseline (r(42) = 0.333; p = 0.032) and reactivity (r(42) = -0.462; p<0.001). Crucially, alexithymia fully mediated the relationship between autistic traits and RSA reactivity (B = -0.015, p = 0.076) but not baseline RSA (B = 0.018, p = 0.162).

**Conclusions:**
These findings support and extend the alexithymia hypothesis to cardiac autonomic reactivity to emotional stimuli. Future work exploring cardiac autonomic activity in autism should control for the mediating effects of alexithymia. Furthermore, these results suggest that interventions which target alexithymia may improve autonomic reactivity, which in turn may improve emotion processing in autism.

437.348 (Poster) Theory of Mind in Autism Spectrum Conditions: A Task-Based Neuroimaging Approach

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Background:

One of the leading hypotheses about the communicative difficulties in autism attributes these difficulties to an impairment in theory of mind (ToM): the ability to understand emotions, beliefs and desires of others (Baron-Cohen et al., 1985). The hypothesis implies that impaired ToM abilities might hinder taking the intentions of a speaker into account during communication (Sperber & Wilson, 2002). Several tasks have been widely used to test ToM abilities, but are lacking in their resemblance to real-life communication (Moessnang et al., 2020).

Objectives:

We use a non-verbal, animated movie to test the possibility that autistic individuals process mental states differently than neurotypical individuals. This movie was designed to induce mental state inferences, and is known to engage the ToM network in neurotypical individuals (Jacoby et al., 2016; Schurz et al., 2014; Paunov et al., 2019).

Methods:

53 neurotypical adults and 52 adults diagnosed with Autism Spectrum Disorder matched on gender and verbal IQ watched the six-minute movie in the MRI-scanner. Afterwards, we administered a questionnaire assessing their understanding of the plot and key emotional and mental state events. We acquired functional MRI (fMRI) data to measure neural activation, and pupil size dynamics as a proxy of processing effort. For the analysis, we contrasted movie sequences previously linked to mental state inferences, emotional processing, and physical events (Jacoby et al., 2016; Paunov et al., 2019). Correlation between time-courses of participants’ pupil diameter during the entire movie (Nastase et al., 2019) was used to identify epochs with between-group differences in similarity of pupil responses. We considered epochs with a duration shorter than one second to represent discrete events, in which primarily single actions of characters take place. Epochs longer than 5 seconds were taken to represent more complex events, in which scenes and narrative-building take place.

Results:

The two groups’ verbal descriptions show similar understanding of the movie plot and of key events. The movie sequences linked to mental state inferences, as compared to physical events, activate core ToM brain regions (bilateral precuneus, angular gyrus and mPFC) in both autistic and neurotypical individuals, and to a similar extent. For the mental state events alone, the groups had comparable pupil size. When assessing the entire time-course of the movie however, epochs in which discrete events happen to the characters evoked weaker inter-participant correlation in pupil diameter in the neurotypical than the autistic group. No such between-group differences were found in epochs at the longer, higher-level time scale.

Conclusions:

This work indicates that neurotypical and autistic participants process mental state events similarly when watching movie sequences, as inferred from behavioral and neural ToM measures. Our findings build upon a large-scale study with a simple non-verbal task (Moessnang et al., 2020), but using a movie featuring animate characters in social interactions, and a data-driven group comparison of pupil size dynamics. Lastly, the group difference in pupil size dynamics might be a sign that autistic people process discrete events within social interactions distinctively, but do not differ from neurotypical processing effort during more complex events.

437.349 (Poster) To Help or Not to Help? Does Theory of Mind Promote Childrens' Helpful Behaviours?

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Background: Helping behaviours are key for children to develop social relationships with others. Toddlers exhibit a range of helpful behaviours, but what socio-cognitive abilities facilitate their spontaneous helping? Theory of Mind (ToM), the ability to understand others’ mental states, promotes various forms of helping in childhood (Conte et al., 2018). Past work suggests that cognitive ToM (mentalizing about others’ knowledge and desires) is related to instrumental helping, while affective ToM (mentalizing about others’ feelings) is associated with empathic helping behaviours (e.g., comforting; Carlo et al., 1991). Although these studies have measured ToM in preschool
children, well after the onset of spontaneous helping, nonverbal ToM tasks have recently allowed researchers to detect implicit ToM during toddlerhood (Poulin-Dubois & Yott, 2018). While the validity of implicit ToM measures is still debated, research suggests that ToM might emerge earlier than previously believed.

Objectives: It is currently unknown whether this implicit, cognitive form of ToM is associated with helping behaviours nearer to their developmental emergence. We address this gap by exploring associations between 30-month-olds’ implicit ToM and two forms of helping behaviour. We expected an implicit cognitive ToM to be more closely associated with instrumental than with empathic helping, as the former requires less consideration of an agent’s emotional state (Carlo et al., 1991). Specifically, the study aimed to: (1) replicate an implicit ToM procedure in toddlers to assess its validity; (2) assess the association between ToM and helping in toddlers with tasks appropriate to their cognitive abilities; and (3) assess whether implicit ToM is more related to affective or instrumental helping.

Methods: Twenty-six toddlers (Mage= 30.30 +/- 0.64 months), participated in the study. Participants completed a validated implicit ToM task (Scott et al., 2012) and had opportunities to engage in an instrumental helping task (e.g., help clean up toys that the experimenter had trouble with) and an affective helping task (e.g., provide emotional comfort to an experimenter feigning injury) (Bryan et al., 2014). Children who preferentially looked towards the belief-consistent image were considered to "pass" the task and thus showed evidence of having ToM.

Results: Toddlers were significantly more likely than chance to look at the belief-consistent image in the false-belief task (p < 0.05), suggesting that 30-month-olds possess representational mentalization abilities. However, ToM was not found to be significantly correlated with helping (r = 0.03) or comforting (r = -0.10) behaviours. Children who preferentially looked towards the correct image were more likely to help (p = 0.67). Children who preferentially looked towards the correct image were no more likely to help (p = 0.67). Children who preferentially looked towards the correct image were significantly unlikely to comfort (p = 0.05).

Conclusions: Thirty month old toddlers showed evidence of possessing a representative ToM by preferentially looking towards the image consistent with false-belief understanding. Helping was not associated with performance on the implicit ToM measure. While these results suggest that ToM and prosociality are along separate developmental trajectories, future research should increase sample size and address confounds in the ToM, helping and comforting tasks before drawing conclusions.

437.350  (Poster) Typical Observers’ Empathy Towards an Autistic Person and the Impact of Disclosure of a Diagnosis
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Background: This study focuses on typical peoples' empathy and interest towards an autistic person and the effect of self-disclosing of the autism diagnosis on these processes.

Objectives: We aimed to investigate whether knowing that a person is autistic changes empathy and social interest towards them.

Methods: We used a modified version of the Empathic Accuracy (EA) paradigm: An autistic adult was video-recorded, sharing an autobiographical story. They were then asked to continuously rate their feelings whilst watching their own video, using a positive to negative rating scale, and to rate the degree to which they felt twelve specific emotions. Study 1 comprised psychology, education, or social-work students (n=101; Mage=24 (SD=3.2), 70% female). Participants were randomly assigned to one of two conditions: watching the autistic storyteller's video following an introduction in which the storyteller disclosed their autism diagnosis (self-disclosure condition); or an introduction whereby they did not disclose their autism (no-disclosure condition). While watching the video, participants rated how positive or negative they believed the storyteller felt on an identical continuous rating scale. They also rated the degree to which they believed the storyteller felt each of the twelve emotions. Measures of EA were derived from the concordance between the storyteller's and perceivers' ratings for both the continuous and the specific emotion ratings. Perceivers were also asked to report the degree to which they felt empathy towards the storyteller and whether they were interested in hearing more or meeting them. In Study 2, we used the same procedure with a sample of STEM students (n=102; Mage=25 (SD=3.2), 41.2% female). In addition, we asked the participants to what degree they would like to work with the storyteller if they were offered to perform a task together.

Results: Study 1 - Participants in the self-disclosure condition performed better in the specific-emotions EA measure (t(97.91)=2.6, p=.01, d=0.52), but not in the continuous EA measure. They reported more empathy (t(79.89)=3.34, p=.007, d=0.66), interest in hearing more (t(79.90)=3.82, p=.001, d=0.76), and meeting the storyteller (t(79.63)=3.62, p=.002, d=0.72). Study 2 - results for the EA measures were replicated, with better specific-emotions accuracy in the self-disclosure condition than in the no-disclosure condition (t(100)=1.69, p=.04, d=0.33), and no significant difference in the continuous measure. Self-reported empathy was approaching significance (marginal), (t(100)= 1.55, p=.06, d=0.31). No differences were found for wanting to hear more or meeting the storyteller. However, participants in the self-disclosure condition reported significantly more interest in working with the storyteller compared with participants in the no-disclosure condition (t(100)=4.59, p=.001, d=0.91).
Conclusions: The results indicate that typical people are more empathic towards autistic people who self-disclose their autism. The effects of autism self-disclosure on social interest of the perceivers and self-reporting their empathy are complex and depend on the characteristics of the perceivers. Greater interest following self-disclosure was found in both studies but was expressed differently in those studying psychology, education, or social-work and in those studying STEM. A better understanding of these social processes may help address autism self-disclosure in social, clinical, and educational settings.

437.351 (Poster) Understanding Camouflaging and Identity in Autistic Children and Adolescents Using Photo-Elicitation
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Background: Although autistic children and adolescents are known to be at heightened risk for experiencing anxiety, depression, and suicidality, it is unknown what factors may contribute to the development and maintenance of these mental health issues. Camouflaging, or the use of strategies by autistic people to hide the visibility of their autistic traits in social situations, is associated with stress, autistic burnout, depression, and suicidality among autistic adults. However, little is known about how autistic children and adolescents experience camouflaging. Hence, understanding of what cognitions and behaviors related to camouflaging may develop and what the early developmental stages of camouflaging may look like.

Objectives: The present study filled this significant knowledge gap by examining camouflaging behaviour among autistic children and adolescents using a photo-elicitation approach.

Methods: Photo-elicitation was used to actively engage children and adolescents in the research process, and to assist participants in sharing their thoughts/perceptions on camouflaging through photography. Seven autistic children and adolescents aged 10 to 14 years (M = 11.57, SD = 1.81) attended an orientation session and were given two to three weeks to take photographs in response to the topic of camouflaging and prompts provided. Individual interviews were conducted with each participant to discuss their most meaningful photos. Additional data collection is currently underway. Preliminary reflexive thematic analysis (Braun & Clarke, 2006) was used to identify major themes within interview data, and an interpretive engagement framework (Drew & Guillemin, 2014) was used to analyze participant images.

Results: Preliminary qualitative analysis identified 13 themes. Camouflaging was perceived by autistic children and adolescents to be a response to negative social experiences, as well as a learned habit that was often unconscious and difficult to stop. Context was important for determining when children and adolescents would camouflag. For example, the company (e.g., friend, family, pet) as well as the activity were important contextual factors. While some autistic children and adolescents camouflaged by suppressing their natural autistic behaviours in social situations (e.g., self-stimulatory behaviour), many camouflaged by generally hiding their authentic selves (e.g., their interests, emotions, and opinions) from others. Camouflaging behaviour was reported as a result of internal conflict, stress, and a need for time alone to recharge.

Conclusions: Initial results from this qualitative study highlight that autistic children and adolescents do engage in camouflaging behaviours. However, compared to autistic adults, there are likely developmental differences in the behaviours and strategies employed by autistic children and adolescents to camouflage. For instance, while research suggests that autistic adults often camouflage to gain positive outcomes (e.g., friendship, employment), the children and adolescents in this study solely spoke about the negative consequences of camouflaging. Camouflaging was reported to be a stressful, confusing, and an energetically draining experience for autistic children and adolescents. Better understanding of the development and experience of camouflaging in childhood can inform prevention of mental health concerns in adulthood.

437.352 (Poster) Understanding the Relationship between Camouflaging Intent and Indicators of Social, Employment, and Mental Health Outcomes

Background:

Many autistic people desire friendships, romantic relationships, and employment and use camouflaging (i.e., specific strategies and behaviours that reduce the visibility of autism characteristics and/or social difficulties) in pursuing these. Currently, it is not known if camouflaging intent (i.e., self-reported engagement in camouflaging) is associated with social and employment outcomes. Yet camouflaging is consistently associated with mental health difficulties. In seeking to improve the lives of autistic people, it is important to develop a holistic understanding of how camouflaging affects multiple life domains including social, employment, and mental health outcomes.
Objectives:

The current study examined (1) relationships between camouflaging intent and indicators of friendship, relationship, and employment outcomes, (2) relationships between camouflaging intent and indicators of mental health difficulties (i.e., symptoms of depression, anxiety, and stress) and psychological distress (i.e., feelings of loneliness) and (3) sex/gender differences in these relationships.

Methods:

430 autistic adults with formal diagnoses completed an online battery of questionnaires. Participants self-reported on their (a) camouflaging intent (Camouflaging Autistic Traits Questionnaire [CAT-Q]); (b) depressive, anxious, and stress symptoms (Depression, Anxiety, and Stress Scale – 21 Items [DASS-21]); (c) feelings of loneliness (University College of California, Los Angeles Loneliness Scale Short Form [ULS-8]); (d) friendships (items on number of friends, close friendship status, close friendship length); (e) social isolation; (f) relationships (items on relationship status and length); and (h) employment (items on employment status and length). In order to better characterise the sample, participants also self-reported demographics and autistic traits (Autism Spectrum Quotient-10 items [AQ-10]). A series of hierarchical linear and nested logistic regressions were conducted to examine the relationship between camouflaging intent and dependent variables. Control variables were selected based on past research as well as statistical relationships in the current data set. In all models, $p < .005$ was considered significant and $p$ values between .05 and .005 as suggestively significant.

Results:

Camouflaging did not predict number of friends, close friendship status, close friendship length, social isolation, relationship length, employment status, or employment length. Higher levels of camouflaging intent were associated with an increased likelihood of being in a relationship after controlling for age, sex/gender, and autistic traits. Higher levels of camouflaging intent were also associated with increased depressive, anxious, and stress symptoms as well as feelings of loneliness, after controlling for age, sex/gender, and autistic traits.

Conclusions:

Owing to the cross-sectional nature of the current study, casual relationships cannot be established. However, camouflaging was not consistently associated with the achievement of social and employment outcomes yet was associated with symptoms of mental health difficulties. Thus, interventions explicitly teaching or encouraging camouflaging type behaviours and strategies (e.g., some social skills programmes) may not help autistic people to achieve their psychosocial goals or promote their wellbeing.

437.353 (Poster) Well-Being Among Autistic and Non-Autistic People with Intellectual Disability during the COVID-19 Pandemic

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Background: There is evidence to suggest that the COVID-19 pandemic has disproportionately impacted vulnerable populations, including individuals with intellectual disability (ID; Lunsky et al., 2022), with many people with ID struggling with numerous COVID-19-related stressors, as well as poorer mental health (Amor et al., 2021; Embregts et al., 2020; Lunsky et al., 2022a; Rosencrans et al., 2021). Less is known, however, about the impact of the pandemic specifically on autistic people with ID. Autistic people often experience more challenges with socio-communicative skills (Shattuck et al., 2011), changes to routine, and coping with stressors (Gillott & Standen, 2007) compared to non-autistic peers, which may have resulted in a greater negative impact of the pandemic on this group. Given that well-being is more than just the absence of mental health problems (Keyes, 2002), it is important to understand how the pandemic has impacted both positive (e.g., thriving) and negative (i.e., mental health problems) aspects of well-being.

Objectives: To examine potential group differences in the experiences of COVID-19-related stressors, mental health problems, and thriving in autistic people with ID compared to non-autistic people with ID.

Methods: An online survey was completed by 168 caregivers of youth and adults between 12 and 35 years of age ($M = 24.46, SD = 5.35$; 63% male) with a diagnosis of autism and ID ($n = 57$) or ID only ($n = 108$) in Ontario (Canada). Caregivers completed questionnaires on the impact of COVID-19-related stressors (adapted version of the Epidemic Pandemic Impacts Inventory; Grasso et al., 2020; Morris et al., 2020) for the youth or adults, as well as their experience of mental health problems (Strengths and Difficulties Questionnaire; Goodman, 1997) and thriving (Six Cs of Positive Youth Development; Lerner et al., 2005).

Results: Independent sample t-tests revealed that non-autistic people with ID experienced significantly lower levels of mental health problems ($p < .001$) and higher levels of thriving ($p < .001$) compared to autistic people with ID. There was no significant difference in the impact of COVID-19-related stressors among non-autistic people with ID compared to autistic people with ID ($p > .05$). Research is ongoing to identify the correlates of thriving and mental health problems among autistic and non-autistic individuals with ID.
Conclusions: Our findings suggest that autistic people with ID experience similar rates of COVID-19-related stressors compared to non-autistic peers with ID, however, they seem to also experience lower levels of well-being. Future research is needed to determine the individual and ecological factors that may explain the differences between these two groups, in the experience of well-being within the context of the pandemic, to help inform interventions and promote well-being among autistic individuals with ID.

437.354 (Poster) What Is it about Camouflaging That Is so Harmful to Autistic Adults?
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Background: In the context of autism research, camouflaging is defined as conscious or subconscious coping strategies and techniques used to minimize the visibility of autistic characteristics and to appear socially competent in a predominantly “non-autistic social world”, despite the persistent existence of cognitive difficulties (Cook et al., 2021; Lai et al., 2011). Three types of strategies have been identified: compensation, masking, and assimilation (Hull et al. 2019). While both autistic and non-autistic people are observed to employ these behaviors, only a few studies attempt to understand the differences between these two groups (Cook et al., 2021). One difference is that the outcome of camouflaging can be more negative for autistic people (Hall et al., 2017; Lai et al., 2017; Keating et al., 2021). Camouflaging is related to stress, mood and self-esteem levels; higher frequency of strategy recruitment, lower rates of success, higher effort to keep up the façade, and greater fatigue may compromise mental health (Ai et al., 2022; Lai et al., 2011; Schneid & Raz, 2020). Nevertheless, it remains unclear what it is about camouflaging that is toxic to the mental health of autistic people.

Objectives: This study was designed to investigate what aspect of camouflaging is particularly harmful to autistic adults by adapting an existing questionnaire measuring social camouflaging behavior, the Camouflaging Autistic Traits Questionnaire (CAT-Q; Hull et al, 2019). To achieve this, four dimensions were added to each camouflaging strategy: frequency, success, effort, and fatigue. Each dimension was rated on a 1-7 scale with an additional "N/A" (i.e., not applicable) option for occasions when strategies were not employed.

Methods: Sixty autistic and sixty non-autistic adults aged between 18-35 (M=25.40, SD=4.11) completed the modified version of the CAT-Q, and the Hospital Anxiety and Depression Scale, a valid and reliable self-report measure to identify the severity of anxiety and depression (Martin, 2005).

Results: The results supported observations that autistic individuals recruit more strategies than non-autistic individuals (Hull et al., 2018). It also determined that autistic camouflagers do so at a higher frequency (i.e., a few times a week), with greater effort and fatigue; however, the subjective success of recruiting these strategies was similar to non-autistic camouflagers. The differences between the two groups were greater for measures describing exertion during and after camouflaging (i.e., effort and fatigue) compared to how often or well the strategies were used (i.e., frequency and success). However, it is the frequency of camouflaging, rather than the exertion felt, that is shown to predict anxiety scores in autistic adults.

Conclusions: Camouflaging involves much greater effort and results in much greater fatigue in autistic adults, but it is the frequency of camouflaging that appears to lead directly to anxiety in autistic adults – the more often you camouflag, the greater your anxiety. This study therefore provides a first step towards understanding the relationship between camouflaging and mental health. This knowledge has the potential to help autistic people make informed choices about how they navigate their social environment while maintaining psychological well-being.

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Background:

As autism research integrates new technological advancements, human-robot interaction (HRI) is becoming increasingly common in studies. Humanoid robots are also being utilised in educational and therapeutic settings to support autistic children. However, experiences such as anxiety (MacNeil et al., 2009), intolerance of uncertainty (Hodgson et al., 2017), and sensory sensitivities (Leekam et al., 2007) can make meeting a humanoid robot a difficult experience for some autistic children. Within the research field, participant withdrawal (Short et al., 2017) is not uncommon. However, there are no agreed methods on how to successfully introduce autistic children to humanoid robots. Establishing methods that work should increase autistic children’s access to clinical or educational opportunities, and improve their representation in relevant research.

Objectives:
To assess the effectiveness of a set of introduction methods (‘familiarisation modules’) based on a systematic review of existing techniques (Wallbridge et al., In Review), the methods aim to help autistic children feel comfortable with meeting a humanoid robot.

**Methods:**

Fourteen autistic children (2 female) aged 4-11 years (M=8 years; SD=1.73 years) and their parents took part in the study. Phase 1 involved online semi-structured interviews with the parents. The parents were introduced to four familiarisation modules: Pre-Familiarisation, Extended Introduction, Stimulus and Response, and Static Exploration. Each module involved at least one activity aimed at increasing familiarity with a humanoid robot. Parents discussed how effective they thought each module would be and whether they had any suggested modifications or preferences. Transcripts were analysed using thematic analysis (Braun & Clarke, 2021).

Phase 2 involved the parents and children visiting the lab. Each child was introduced to a humanoid robot (NAO; SoftBank Robotics) using the four familiarisation modules in a set order. After completing all the modules, the children were interviewed about how much they liked the robot and the modules. Their parent observed the familiarisation process through a two-way mirror and rated their child’s comfort levels and enjoyment after each module using Likert scales. They were also given a semi-structured interview to provide a more detailed account of how they thought their child responded to the robot. As with Phase 1, this was transcribed and analysed thematically.

**Results:**

Preliminary analysis shows most parents thought that the Stimulus and Response module, in which the child and robot participate in an interactive activity, was the most effective module for helping their child feel more comfortable around the robot. Many parents also felt that the modules needed to be longer to achieve better familiarisation. Most children said they would be happy to play with the robot again, and parents’ Likert scales indicated that children were more comfortable around the robot after experiencing the modules.

**Conclusions:**

Preliminary findings indicate that our familiarisation modules, which were informed by a systematic literature review, were an effective tool for introducing autistic children to humanoid robots. Interactive activities may be a particularly important part of the process. Further research is needed to compare the use of our familiarisation modules to less systematic approaches to introducing autistic children to humanoid robots.

**437.356 (Poster) “If I Do This, He’ll be My Boyfriend”: Transactional Thinking in Autistic Female Sexuality**  
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Background: Autistic females present with a profile marked by a mismatch between sexual interest and experience, increased engagement in unwanted sexual behaviours, and elevated risks to sexual victimisation. The factors underlying sexual behaviour engagement and increased vulnerabilities are poorly understood.

**Objectives:** To identify the motives underlying increased sexual behaviour engagement and mechanisms behind greater sexual vulnerability among autistic females.

**Methods:** 381 adults (134 autistic females; 161 non-autistic (N-ASD) females; 96 autistic males) completed the Sexual Behaviour Scale-III (SBS-III) online.

**Results:** Despite expressing a shared interest in romantic relationships with both N-ASD females and autistic males, autistic females were more likely to endorse transactional processes when describing their motives behind sexual behaviour than N-ASD females (OR=4.18; p<.01), and autistic males (OR=2.14; p<.01); and were more likely to endorse transactional behaviours to initiate relationships than N-ASD females (OR=1.74; p=.05). Autistic females, and transgender individuals were also more likely to endorse sexual, over financial transactional behaviours as a means of relationship formation than autistic males (OR=6.53; p<.001) and cisgender counterparts, respectively (OR=4.20; p<.001).

**Conclusions:** Within autism, sexual interactions may be driven by transactional, rather than the socially reciprocal exchange processes seen in the N-ASD group. This includes a perception that relationship development may be attained via sexual behaviours among autistic females and transgender adults, yet through the provision of financial or material items among autistic males. It is important to further explore transactional exchange processes within autism, to inform sex specific education to support the development of positive strategies to facilitate meaningful relationships.
Background:

Previous research highlights the wide-ranging difficulties that autistic children and young people experience in mainstream education. There are a number of areas where children are not being optimally supported and face challenges to learning. These include negative relationships with staff, difficulties with the school sensory environment, peer relationships, and increased likelihood of bullying and subsequent effects on mental health and self-esteem. While there is a growing body of research in the areas identified above, there is a dearth of literature understanding these difficulties from the child’s perspective. Therefore, the current study aimed to understand barriers to learning and support from children themselves. It is crucial that researchers are aware of the multidirectional relationship between these areas, and how they influence each other, in order to improve the school experience and well-being for autistic pupils.

Objectives:

The aims of the research were to investigate the school experiences and well-being of autistic pupils in mainstream secondary schools. The research focused on

1. Experiences with teachers and support staff.
2. Experiences with friends and peers.
3. Experiences with the classroom and school environment.
4. General feelings towards school and well-being.

Methods:

A total of 15 participants, aged 11-18 years were recruited for this study (10 = male, 4 = female, 1 = non-binary). 13 participants had received a clinical diagnosis, and 2 participants were self-diagnosed and seeking a clinical diagnosis. Data was collected using a mixed-methods online survey. This consisted of 10 multiple choice questions and 13 requiring written responses. The survey was advertised via social media (Facebook and Twitter). Thematic analysis was used to analyse the data, following the six phases of analysis proposed by Braun and Clarke (2006).

Results:

Three main themes were identified from the data through analysis: 1) support and challenges to learning, 2) contributing and mitigating factors to well-being, 3) experiences of friendship and bullying. Each theme comprised of several subthemes. In the first theme participants described barriers to their learning, current strategies implemented by their teachers, and other adjustments they deemed would be helpful to them in school. In the second theme, participants reported struggles with anxiety and low confidence, however also shared similar sources of happiness including their friends and family. In the last theme “experiences of friendship and bullying”, participants discussed their experiences of friendship and relationships with peers, both positive and negative.

Conclusions:

This study adds to the existing literature surrounding the school experiences of autistic pupils and their well-being in mainstream secondary schools. The study found identified overlapping experiences between participants in terms of the impact school on aspects of wellbeing such as bullying and the sensory environment, as well as suggestions for strategies implemented to implement in schools. The results highlight the need for changes in the ways that mainstream schools support and include autistic pupils, and the to provide training for staff to better support pupils learning and well-being.

Background:

Existing literature on social communication in autism primarily focuses on the communication difficulties between autistic and non-autistic people, presenting this as an autistic ‘impairment’. However, recent research – which has found highly successful social communication
between autistic people – suggests this may not be an accurate framing. Instead, it may be that autistic people have a communication style
that is incompatible with non-autistic people’s, but compatible with other autistic people’s.

What features might define this communication style, and what might cause the differences between it and a non-autistic one, are currently
unclear. Improving our understanding of this autistic communication style may help improve communication between autistic and non-
autistic people.

Objectives:

Primarily, to explore autistic people’s experiences of social interaction and communication, and their preferences for this – with a focus on
differences between interactions with other autistic versus non-autistic people. Secondarily, to gather autistic feedback on a list of ‘autistic
social values’ derived from the thematic analysis of a previous, similar focus group.

Methods:

9 autistic adults (9W, 1NB; mean age = 43, range = 23-58) without intellectual disabilities took part in an online, forum-style focus group
for two weeks. The primary topics were: (1) what people consider their ‘social values’ to be (e.g. their rules/expectations around
communication), (2) what they found frustrating about interacting with non-autistic people, (3) what ‘positive social interactions’ looked
like for them, (4) anything else they wanted to say on the topic, and (5) thoughts/opinions on a list of ‘autistic social values’ produced by
the researcher from a previous focus group. The fifth topic was introduced a week into the group, to minimise influence on other responses.

Results:

Thematic analysis of the focus group is ongoing, but the following themes are indicative:

- Managing Social Energy: autistic people often have limited social energy, and managing/rationing this in social situations can be
challenging.
- Sources of Anxiety: there are many sources of anxiety for autistic people in social interaction, including transitions, uncertainty,
the risk of upsetting or offending people, or being bullied.
- Frustrations with Non-Autistic People: non-autistic people’s insistence on doing things a certain way, and inability to consider
autistic perspectives, is frustrating.
- Differences in Empathy: things that may be kind and empathic from a non-autistic perspective may not be from an autistic
perspective. There is a mutual lack of understanding.
- Importance of Community: being around other autistic people is important for self-understanding and wellbeing.

Next steps include further development and finalisation of these themes through a second round of analysis. The completed analysis will be
presented at INSAR.

Conclusions:

Autistic adults have different expectations and desires around social interaction and communication. This is driven, at least in part, by
different social, communicative, and emotional needs. These differences can make interacting with non-autistic people difficult and
stressful for autistic people, and contribute to miscommunication between neurotypes. More work is needed to fully understand a) what
defines the autistic communication style, and b) how to best bridge the gap between autistic and non-autistic communication styles.

437.359 (Poster) Mentalizing Skills, but Not Autism Diagnosis, Predict Indirect Request Interpretation
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Background: Indirect request forms fall into two categories: conventionalized and non-conventionalized. Conventionalized forms (“Can
you turn on the heater?”) require little inferencing to be interpreted as requests, whereas inferencing is required to interpret non-
conventionalized forms (“I’m cold.”). Previous research suggests that autistic adults can successfully interpret indirect requests (Deliens et
al., 2018), but this research focuses on conventionalized forms. There is reason to suspect findings would differ for non-conventionalized
requests: Recent evidence from non-autistic adults shows that those who score lower on mentalizing tasks are less able to infer if an
utterance is a request based on context (Trott & Bergen, 2018; 2020). Given that autistic individuals commonly score lower on mentalizing
tasks (e.g., Baron-Cohen et al., 2001), autistic adults may show less accurate performance in their interpretation of non-conventionalized
requests.

Objectives: To compare the performance of autistic versus non-autistic adults on a non-conventionalized request task.

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Background: Autistic individuals identify difficulties expressing emotions to others as a barrier to effective social communication. This is consistent with research indicating that autistic individuals present with a muted range of facial expressiveness relative to neurotypicals. However, growing literature portrays a more nuanced picture. Recent evidence suggests that autistic individuals’ facial affect may vary across contexts (solitary vs. social; elicited vs. spontaneous), making it important to research differences in affective presentations across situations. For example, emerging data indicate that autistic individuals produce more intense spontaneous expressions in monadic (solitary) situations than their neurotypical peers, despite the fact that reduced facial affect is typically considered a prominent autism marker. Research is needed to directly compare affective presentations in non-social contexts, using experimental methods that can effectively evoke and measure a range of spontaneous facial expressions. In response, this study develops and tests a novel “Monadic” emotion elicitation battery and analyzes expressions using precise computer vision methods.

Objectives: To test the ability of our Monadic battery to elicit spontaneous facial expressions in autistic individuals in a solitary context; To use computer vision analysis to characterize and compare facial expressions across a neutral task, a frustrating task, and viewing of humorous videos.

Methods: The present project is recruiting 60 participants by May 2023; data collection so far consists of 17 autistic 12–17-year-olds, of whom 13 provided evaluable data (see Table 1). The Monadic Protocol is comprised of three computerized tasks that participants complete independently. The “neutral” task is watching a brief video (“inscapes/INS”) chosen for its affectively-neutral visuals in order to obtain a resting facial state. The “humorous” task consists of watching two videos (“bubbles/BUB” and “lemon/LEM”) chosen to evoke positive emotion (i.e., a child and dog playing with bubbles and an infant eating a lemon slice, respectively). The “frustration” task (“block task/BT”) required participants to quickly identify the smallest of three rectangles over 50 trials, while randomly “freezing” mid-trial in order to evoke mild negative emotion (frustration). Facial video was recorded during each task at 4K resolution and 30 frames per second. Videos were analyzed with OpenFace (an open-source software) to capture facial action units, then processed frame-by-frame for affect summary variables using our in-house Python Biological Motion Capture toolbox. Expression magnitude was characterized by the area under the curve over time during each video, with separate averages for neutral, positive, and negative emotion expressions. Wilcoxon one-sample tests were used to compare the presence of milder negative emotions across tasks.

Results: As predicted, BT elicited more angry \( (p<0.05) \), sad \( (p>0.01) \), and fearful \( (p<0.05) \) expressions than INS, and BUB elicited more happy expressions than INS \( (p<0.05) \). LEM also elicited significantly more happy expressions than INS \( (p<0.05) \).

Conclusions: This study supports the validity of the Monadic battery’s ability to evoke a range of spontaneous facial expressions in autistic youth. With the full sample, we propose to examine how individual difference variables such as anxiety and emotion regulation ability

437.360 (Poster) Methodological Advances in Evoking and Measuring Spontaneous Facial Expressions in Autism


Conclusions: Mentalizing scores, but not autism diagnosis, predict how adults infer whether an utterance is a request. Findings suggest that autistic adults are successful at interpreting non-conventionalized requests. This may be due to both groups having comparable mentalizing skills, perhaps because the autistic group’s skills are fully developed by adulthood. Future research should compare how autistic children and adolescents compare to their non-autistic peers on a similar task.
Background: A large literature documents atypical gaze in individuals with autism. Many different visual features appear to contribute to this finding, including atypical center bias, atypical gaze onto faces, objects of joint attention, or biological motion. The heterogeneity of visual features that might drive atypical gaze is revealed by large individual differences in participants. These challenges are compounded when measuring gaze to videos, where rich sets of features change continuously. This has made it difficult to quantify robust gaze differences at the group level (autism vs. controls).

Objectives: Here we aim to comprehensively quantify the visual features that drive gaze differences over time between autistic (ASD) and control (CTL) groups, as well as within each population. We developed a novel method to quantify the between- and within-group variability of gaze trajectories across a naturalistic video stream decomposed into three levels of visual features (low-level, object-level, and semantic-level).

Methods: 20 typically developed CTL participants with no family history of autism (3 females, age = 32.2 ± 5.5) and 10 ASD participants with a DSM-5 diagnosis of ASD (2 females, age = 29.8 ± 5.4) who met criteria on the ADOS-2 (module 4) were recruited. All participants had normal-range IQ and corrected-to-normal visual acuity. In a well-controlled lab environment, participants watched 18 diverse short-sounded youtube videos (length = 79.0s ± 22.0s) while eye-tracking data was collected (Tobii TX 600). To quantify the variability of gaze patterns over time, we applied a novel method - dynamic trajectory variability analysis (Fig 1). We constructed trajectory dissimilarity matrices (TDM) over sliding time windows between all pairs of individuals watching the same video segment, using dynamic time warping. Every TDM was subsequently decomposed (and averaged) into 3 parts: variability between ASD and CTL (var_diff), variability within CTL (var_ctl), and variability within ASD (var_asd). We then ran a linear regression model predicting each of the 3 types of variabilities with three levels of video features (calculated for each frame). Low-level features include the entropy of Itti-Koch saliency maps (color, intensity, orientation); object-level features include the existence of 13 common object categories; semantic-level features include four measurement of face information (number, average size, max size, total size).

Results: Our regression analysis quantified the effects of visual features in the video on the variability in eye gaze, within each participant group as well as between groups (Fig 2). Consistent with prior work, we found that all three types of variability can be substantially explained by video features (R^2_var_diff = 0.346, R^2_var_ctl = 0.358, R^2_var_asd = 0.241), but that effects were distributed across visual features, essentially producing a multivariate “fingerprint” that characterized how the features in the video influenced variability in eye gaze.

Conclusions: Dynamic trajectory analysis provides a principled and powerful tool to decompose eyetracking data to videos. Our code will be fully shared, can be used in future investigations with larger sample sizes to better understand the visual features that distinguish atypical gaze in autism, and may provide a basis for identifying possible subtypes.

Background: The Frankfurt Early Intervention Program (A-FFIP) is a naturalistic developmental behavioral intervention (NDBI) that trains autism-specific developmental targets in the preschool age at a low intensity of two times per week. Eye-tracking measures have been established as independent indices of outcome evaluation. Joint attention is an early indicator of different socio-communicative development that can be objectively quantified in eye-tracking. Pupillary response is an index of neurophysiological reactivity that is discussed as a potential biomarker of different sensory processing.

Objectives: We wanted to investigate direct effects of the A-FFIP intervention on eye-tracking measures of joint attention and an associated pupillary response as a biomarker of change.
Methods: Autistic preschoolers were assessed longitudinally at baseline (T2, n=51), after 6-months of A-FFIP (T4, n=44), and after 12-months of A-FFIP (T6, n=31). This was compared to baseline assessments in developmentally matched neurotypical controls (K, n=44). Joint attention is quantified with an established video paradigm (i=16), in which a protagonist induces reactive joint attention (RJA) to displayed objects by non-verbal cueing. Each video starts with a fixation cross for 1s, before a protagonist’s direct camera gaze for 3s. Next, protagonist’s cueing is displayed for 6s. We define RJA as a participant’s gaze sequence from the protagonist’s head to the cued object within 0.5s. We compared the likelihood to RJA between groups (K, T2, T4, T6) in generalized multilevel mixed models on a per-trial level. We further modelled pupillary response as a 6-degree polynomial to investigate dynamic group differences between groups within the video scenes.

Results: Group differences (F(3,1478) = 12.68) were described by a higher RJA likelihood in K compared to T2, T4, T6 (all βs > 1.07 [0.38; 1.76]). Importantly, a putative intervention effect was observed with a higher RJA likelihood in T6 compared to T2 (β = 0.55 [0.05; 1.05]), which translates to a 72% increased likelihood to show RJA after versus before intervention (figure 1A). The putative intervention effect is driven by increased RJA after cueing onset (β = 0.67 [0.16; 1.19]) compared to premature RJA before cueing onset (β = -0.55 [-1.27; 0.17]) (figure 1B). Across groups, pupillary responses after cueing onset (and not before cueing onset) were positively associated with RJA likelihood (β = 0.21 [0.07; 0.34]). Between groups, pupillary responses for three seconds after cueing onset were higher in T6 compared to T4 (βs = 0.02 – 0.06) and T4 compared to T2 (βs = 0.06 – 0.14, figure 2).

Conclusions: Findings are limited as therapy effects are confounded with developmental effects that are, however, unlikely to be of this magnitude (+72% RJA increase). Thus, the A-FFIP program is probably associated with an increased likelihood to exhibit joint attention after 12-months of intervention. This is observed in an objective measure unrelated to intervention content and explained by an improved utilization of social cueing. Increased pupillary responses after cueing onset are associated with RJA and could reflect increased neurophysiological responsivity to social cueing as an underlying mechanism, which is proposed as a biomarker of change in response to intervention.

Objectives: To examine the neural, cognitive, and behavioral characteristics of compensation in children diagnosed with ASD, ADHD, and TD.

Methods: Participants (N=74) included 7-11 year-olds with WASI-2 Full Scale IQs of 80 or above and an ASD diagnosis (n=53; ADOS-2, ADI-R, DSM-5), ADHD diagnosis (n=10; Connors, CBCL, DSM-5), or TD (n=11; DSM-5, CBCL). Participants completed the Social Attribution Task-Revised (SAT-R), which produced open-ended narratives that were coded for spontaneous ToM; the Stop-Change Task, which yielded stop-signal reaction times (SSRTs) as a measure of response inhibition; and the Go-Nogo task, which produced N2 and P3 ERP amplitude and latency in the No-go condition as neural measures of conflict monitoring and inhibition. Caregivers completed the Social Responsiveness Scale (SRS) as a measure of social autistic traits (Social Communication Index [SCI]) and the Behavior Rating Inventory of Executive Function (BRIEF) as a measure of real-world behavioral regulation (Behavioral Regulation Index [BRI]). Participants were split on the TD SAT-R median, creating groups with higher ToM (>3) and lower ToM (≤3), and the clinical cutoff for SRS SCI, forming groups with higher social autistic traits (>59) and lower social autistic traits (≤59). The High Compensation (N=14) and Low Compensation (N=29) groups were compared (Figure 1). Given observed age differences, ANCOVAs controlling for age were conducted.

Results: Relative to Low Compensators, High Compensators had larger N2 and P3 amplitudes in the No-go condition of the cued ERP Go-Nogo task, indicating increased strength in neural conflict monitoring (N2: p=.01, F=7.15) and inhibition (P3: p=.002, F=11.57); shorter SSRTs in the Stop-Change Task, indicating increased response inhibition (p=.03, F=5.25); and lower BRIEF BRI scores, indicating fewer real-
world behavioral regulation difficulties ($p=.009$, $F=7.52$). The proportions of Compensation group membership did not differ by DSM diagnosis ($p=.26$, $\chi^2=4.02$); High Compensation (ASD: $n=9$, ADHD: $n=2$, TD: $n=3$) and Low Compensation (ASD: $n=25$, ADHD: $n=2$, TD: $n=2$) groups included children across diagnostic categories.

Conclusions:

We found evidence suggesting the neural, cognitive, and behavioral transdiagnostic profile of compensation among children with low social autistic traits despite poor spontaneous ToM. In line with a developmental psychopathology theoretical framework, results suggest compensation should be conceptualized as transdiagnostic resilience seen across ASD, ADHD, and TD and measured with multiple levels of analysis (brain, cognition, and behavior).

437.364 (Poster) Non-Autistic Adults Recognize Autistic Adults’ Emotional Expressions Better Than Non-Autistic Adults’.

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Background: Autistic people’s emotional expressions are often misunderstood by non-autistic people, something autistic people describe as detrimental to their well-being. Few studies, however, have investigated how well non-autistic adults recognize autistic adult’s posed emotional expressions, and none, to our knowledge, with a large sample.

Objectives: In three studies we investigated non-autistic participants' recognition of autistic and non-autistic people’s posed emotional expressions, and the factors that contribute to accurate recognition of those expressions. Studies 1 and 2 asked whether non-autistic adults better recognize the facial emotional expressions of autistic or non-autistic adults, and whether performance on this task depends on the amount of time participants can view the stimuli. Study 3 asked what attributes of the faces used in Studies 1 and 2 led to them being correctly recognized.

Methods:

In Study 1, 371 non-autistic participants viewed photos of 12 autistic and 12 non-autistic posers in each of six emotional expressions (anger, disgust, fear, happiness, sadness, and surprise). They were asked to decide which of the six emotions was shown on each face. Faces remained visible until participants made their selection.

In Study 2, 159 non-autistic participants completed a task similar to that in Study 1, but either in a timed or untimed condition. In the timed condition, participants could view each face for only 800ms before making their decision about what emotion was depicted. The untimed condition was a replication of Study 1.

In Study 3, 166 non-autistic participants saw the same stimuli in Studies 1 and 2, were told the emotion it was meant to convey, and were asked to rate each expression for how awkward, posed, good and intense each expression was.

Results: Figure 1 shows the results of Study 1. As the figure shows, autistic faces were recognized significantly more accurately for all emotions except for happiness, $F(5, 4070) = 18.79, p < .001$. Study 2 found this advantage even when participants’ exposure to stimuli was brief (800ms), $F(1, 1883) = 84.18, p < .001$. Finally, Figure 2 shows the results of Study 3. As the figure shows, we found that this advantage in recognition accuracy occurred because non-autistic adults perceived autistic expressions as better and more intense examples of emotion expressions, $F(5, 23693.09) = 27.04, p < .001$; goodness and intensity ratings predicted recognition accuracy from Study 1, $t(135) = 12.32, p < .001$.

Conclusions: We found no evidence to suggest that non-autistic adults have difficulty recognizing the posed emotional expressions of autistic adults. These findings suggest that in-vivo misunderstandings between autistic and non-autistic arise in the more dynamic, naturalistic expression of emotion.

437.365 (Poster) Online Vs. in-Person Autism Research: Same Self-Reported Symptoms, Different Social Behaviors

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Background:
Given the challenges surrounding patient recruitment for in-person research, especially during the COVID-19 pandemic, many researchers have begun utilizing online approaches to assess behavior in individuals with psychiatric illnesses and neurodevelopmental disorders (e.g., Wise & Dolan, 2020). Such remote studies have many benefits, most notably the speed and ease with which one can recruit a large sample, and insight into individuals’ own subjective experiences. However, these studies forego the rigorous in-person clinical characterization of lab-based studies, generally relying solely on self-report questionnaires. Such approaches may limit our ability to appropriately capture disorders with known deficits in metacognitive awareness, including autism spectrum disorder (ASD; McMahon et al., 2016).

Objectives:

In the current study, we aimed to evaluate behavior during social interaction in participants with high ASD symptoms recruited online vs. in-person. In assessing complex social decision-making, such a design allows to gain a deeper understanding of the phenotypes of each group.

Methods:

An in-person sample of ASD patients (diagnosis confirmed with ADOS and DSM by psychologist, n=36) and a large online sample (unselected for any diagnosis, n=632), completed two naturalistic interaction tasks probing complex social behaviors. A computational modeling approach extracted signals of interest based on the trajectory of decision-making in each task. The online sample was divided into the highest and lowest quartiles of self-reported ASD symptoms (Broad Autism Phenotype Questionnaire), and samples of 36 individuals were created from within each quartile to match the clinical sample on age and sex. Group differences in social task parameters were evaluated with ANOVA (3-group, p-values corrected for multiple comparisons with Benjamini-Hochberg procedure); the directions of effects for clinical vs. high-trait groups were determined through post-hoc t-tests (2-group).

Results:

Despite having comparable levels of self-reported ASD symptoms (t=-0.32, p=0.75), the high-trait online and clinical in-person samples differed in their social behavior. In a social interaction game, the clinical group showed lower affiliation tendencies with virtual characters (3-way ANOVA: F=12.14, p<0.001; high-trait vs. clinical t-test: t=-3.33, p=0.001) and higher consistency in interactions that shifted the power dynamics between themselves and virtual characters (3-way ANOVA: F=10.77, p<0.001; high-trait vs. clinical t-test: t=-4.08, p<0.001). In a social monetary exchange task, the clinical group showed lower rejection rates of offers proposed by virtual partners (3-way ANOVA: F=3.71, p=0.028; high-trait vs. clinical t-test: t=-2.03, p=0.042).

Conclusions:

Different patterns in social behavior between the online and clinically ascertained in-person samples highlight the need for differentiation between trait-level and clinically defined groups, as well as the importance of assessing task-related behavior in online studies to help understand the characteristics of the sample.

References:


437.366 (Poster) Pattern of Eyes Fixations Drives Motor Responses and Social Engagement during Gaze Processing in Autism

Background: Many endophenotypes are linked to the development of autism but one of the most reliably replicated early predictor of autism is atypical social engagement and in particular, attenuated eye gaze contact. However, while it has received much attention so far, conflicting theories on the mechanism responsible are questioned whether individual with autism perceive eyes as less salient (due to amygdala hypoactivation) or unpleasant (due to amygdala hyperactivation-mediated arousal) and how that impacts the following behavior.

Objectives: To test how pattern of eye observation of faces with direct or averted gaze involved in social engagement of participants with autism in comparison with individuals without autism in relation to their motor responses and severity of clinical scores.

Methods: As a part of the InFoR cohort, a multi-center French longitudinal study, 88 participants with autism (ASD group) and 56 participants without autism (TD group) performed a gaze discrimination task using colored static pictures of faces with either direct or averted gaze (Figure A). We monitored eye fixation behavior using eye tracking during observation of the face and measured subsequent response times (RT). Also, we estimated the relationship between these variables and the clinical scores: Social Responsiveness Scale (SRS), Attention Deficit Hyperactivity Disorder Rating Scale (ADHD-RS), Behavior Rating Inventory of Executive Function (BRIEF) and VINELAND Adaptive Behavior Scale. To analyze the data, we conducted ANOVAs and non-parametric statistics to test the effects of the group (ASD vs TD) and social engagement condition (direct gaze vs averted gaze). A mediation analysis was realized to test if eye fixation behavior could explain the effect of the group on RT.

Results: The eye fixation index (Figure B) was found to be significantly reduced for ASD participants. More social engagement into observation of images with direct gazes was found for both TD and ASD group. We also found that RT was significantly longer for ASD group, and that it was strongly and negatively correlated with the eye fixation index. The mediation analysis data demonstrated that the influence of group on RT was driven by the eye fixation index. All clinical scores were significantly higher in ASD compared to TD group. Longer RTs were related to indexes of ADHD-RS, BRIEF and SRS even after correction for the effect of group by partial correlation. The relationship between eye behavior and social and adaptive skills (SRS and VINELAND) were entirely explained by the group differences in either domain.

Conclusions: the pattern of eyes observation in ASD and TD participants shows both sensitivity to group and condition of the task and governs following motor behavior of the participants. This decision making sluggishness may be in turn related to participants’ anxiety, poor executive control, attention/hyperactivity and social adaptation clinical scores.

Figure A. Experimental design and trial structure. 28 face photographs from 14 different persons looking directly or aside were presented for 3s each; after each face presentation a screen of choice was presented. After a participant’s response, the next trial starts. B. Definition of AOI eyes and eye fixation index.

Background: The number of autistic students at university is growing, although recent evidence indicates that autistic students have lower continuation rates compared to non-autistic or other disabled students (Ashbaugh et al., 2017). Previous work has demonstrated that the academic performance of autistic students is judged negatively by their non-autistic peers (Alhusayni et al., under review) however it is currently unclear whether these negative perceptions are accurate or the result of bias. Further, we do not yet know whether autistic students are aware of these negative perceptions.

Objectives: This study seeks to examine 1) whether negative perceptions are robust in a new group of autistic and non-autistic targets and 2) to evaluate the mechanisms through which these negative judgements might impact autistic students. Specifically, it will assess the accuracy of perceiver’s judgments of autistic and non-autistic student’s academic performance, and assess whether autistic students hold accurate meta-perceptions of their own academic performance.

Methods: Thirty-four target videos were recorded from university students who were completing a questionnaire online (17 autistic, 17 non-autistic, mean age=22 years). All targets self-reported their average academic grade, and their success, motivation and happiness at university on 6-point Likert scales. They also reported how others would perceive them on the same measures (meta-perceptions). Target videos were edited into 7 second clips.

Thirty non-autistic students (26 females) aged between 18 and 33 (M = 20.23 years, SD = 3.68) viewed the target videos. Perceivers were then asked to rate each target on the same four aspects related to university life.
We examined whether perceivers judged autistic students more negatively than non-autistic students. To examine accuracy and bias, other-perceptions were compared to self-perceptions to establish whether targets were over- or under-estimated. Meta-perceptions were compared with other-perceptions to determine whether targets were aware of how they are perceived.

Results: Replicating previous work, autistic students were judged more negatively across all dimensions of academic life compared to non-autistic students (p<.040). Compared to self-perceptions, there was a general tendency to underestimate targets from both groups. However, there was moderate evidence that non-autistic targets were accurately perceived on some dimensions (happiness: BF\_0\_1=3.452, motivation: BF\_0\_1=3.672). Finally, both autistic and non-autistic students were generally unaware of how they are perceived and thought they would be perceived more positively than they actually were (p’s .001 - .023).

Conclusions: This work demonstrates that autistic university students are more negatively judged than non-autistic students. There is some evidence that these judgements stem from underestimations of autistic students. However, it appears that they are not aware of these judgements. Therefore, it is unlikely that negative judgements have an impact on student performance via a self-fulfilling prophecy. Further research will need to examine whether negative judgements impact academic performance via other routes (i.e. social exclusion from learning opportunities).

### Technology Demonstration

**POSTER SESSION — TECHNOLOGY DEMONSTRATION**

**428 - Technology Demonstration**

**428.401 (Poster) A Multi-Player Virtual Reality Serious Game to Foster Social Skills in Autistic Teens**


Background: VR technology to allows instructors and therapists to offer safe, repeatable, and diversifiable learning environments for autistic individuals. Such technology has shown marked recent growth and many companies have started exploring the market and developing potential solutions. For example, some commercial tools are already available on the market with a focus on both individual and clinical use (i.e. Floreo and Auticare). However, both are focused on a single-player usage and leverage real-life exercises of little engagement for some video game users that may be most motivated to use the technology (e.g., pre-teens and young-adults). Moreover, the lack of companion tools to analyze the stress status of the players hinder the possibility to exploit them as a tele-therapeutic solution.

Objectives: To develop an engaging multi-player VR-based serious game to foster social skills in autistic teens and explore their viability as a tele-therapeutic solution.

Methods: The implemented VR solution focuses on a multi-player immersive setting where a small group of teens can play and interact with each other remotely through their digital avatars. The therapist participates within the immersive setting too by acting as a facilitator. Real-time monitoring of the emotional status of each player allows the therapist to promptly intervene in case one or more players face stressful conditions. Our VR solution leverages biometric data analysis of heart-rate signals generated by a heart-rate monitor bracelet worn by each player. The VR session is built around a fantasy game adventure where a small group of teens act as a team of space explorers. Each mini-adventure has been codesigned in collaboration with experts on autism and is aimed at facilitating collaborative and problem-solving activities among players as well as to improve executive function skills (e.g. selective attention).

Results: A preliminary assessment has been performed with 33 autistic teens from different age groups (8-10; 11-14; 15-17; male to female ratio: 4:1), with the aim of examining level of engagement with the game environment and challenges, as well as the therapist’s capability to handle different situations in which the teams were involved along the adventure. Analysis of the post session individual interviews with teens showed that there was a high appreciation of the VR game along the dimensions of engagement, clarity, interaction with objects, movement, user experience and willingness to play again in the VR environment. Ratings on these dimensions on a 1-5 Likert scale (1=low, 5=high) measuring appreciation, reached an average rating greater than or equal to 4 on all dimensions. All the feedback and insights collected from the interviews with teens and observations of their behaviors during the VR game have been used to improve its design even further.

Conclusions: We show that our multi-player VR serious game is highly engaging for autistic teens and allows for interaction in a group setting with a therapist to facilitate interactions. Future work can investigate use of such technology to facilitate and improve social skills in autistic teens within in-person and tele-health settings.
428.402 (Poster) A Multimodal Virtual Classroom Interface to Facilitate Discovery of Behavioral Patterns in Response to Sensory Stimuli
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Background:

Virtual reality has been investigated for assessment, intervention, and education targeting features associated with Autism Spectrum Disorder (ASD), due to being well-controlled and delivering engaging information. These provide a good foundation to collect behavioral data in response to particular stimuli. In the last decade, online learning has become more widely applied for children with ASD, especially during the COVID pandemic. Traditional interfaces (e.g., Zoom) consist of snapshot-size videos of participants and a few operational buttons that do not simulate the feeling of a real classroom, which is essential for children with ASD to learn key coping skills. Therefore, creating an interface that provides a more realistic classroom experience is beneficial. We designed a new multimodal interface that presents common sensations in a screen-based virtual reality (VR) classroom. Children’s reaction to the interface discloses behavioral patterns in response to multimodal sensory stimuli, providing references for future virtual classroom design.

Objectives:

This study aimed to: 1) develop a multimodal virtual classroom interface that simulates common sensations in a real classroom; 2) evaluate feasibility of the interface for students with ASD; and 3) explore if data collected using the interface can disclose unique behavioral patterns in children with ASD.

Methods:

The new interface presented a 3D virtual classroom occupied by virtual classmates and a virtual teacher. Figure 1 shows the real setting for the experimental study. Visual (e.g., avatar motions), auditory (e.g., the sound of flipping pages and people talking), and tactile (i.e., the feeling of holding and writing with a pen) stimuli were incorporated. Tactile sensations were provided through a small haptic robot. A limited-time word-counting task was used as an example to study children’s responses. Users needed to count how many times a particular word appeared in reading material and select an answer matching their counting.

Results:

Nine adolescents with ASD (Age (years): mean = 13.17; SD = 1.52) and twelve TD adolescents (Age (years): mean = 13.10; SD = 1.84) participated in the study. The new interface worked smoothly. All subjects tolerated the interface and accomplished the task. Gaze fixation distribution of both groups are presented in Figure 2. Visual behavior analysis showed that children with ASD’s gaze fixation was significantly less (Wilcoxon rank sum test, p = 0.00) concentrated on the word scanning area than the TD participants, coinciding with previous research that children with ASD experience more difficulties focusing on certain classroom tasks. Meanwhile, the gaze distribution across the background area was low for both groups without any significant difference.

Conclusions:

Our preliminary findings demonstrate that adolescents with ASD can engage with a virtual classroom interface with sensations simulating real-life experiences. Such an interface can reveal behavioral similarities and differences between users with ASD and their TD peers. These will facilitate future design and application of VR based online/remote learning.

428.403 (Poster) Access, Acceptability and Satisfaction of Pivoting to Online Self-Paced Professional Training for Delivery of a Children’s Social-Emotional Skills Program.
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Background:

Over 18 years a PhD project has progressed to empower autistic children’s social-emotional resilience across multiple countries and gather 20+ publications demonstrating its effectiveness and application to various settings and families. In 2020, a co-designed program transformation into a digital health solution occurred; remaining true to the evidence-base clinical best practice and community utilization. Through careful planning and testing, the program content, process and physical resources became one integrated software package including digitisation of the previously two-day facilitator training course alongside the addition of a course for assistants as requested by the advisory group.

Objectives:
Within the context of software development objectives, digitisation of the professional training aimed to reduce geographical attendance barriers, maintain high trainee satisfaction, enhance learning suited to workplace/client needs, allow practical 'just-in-time' review, and provide new consistent and streamlined learning for assistants.

Methods:

The six-step co-design process involved fast-paced cyclic feedback with an advisory group of clinicians and educators from sectors around the globe, program author, software developers, children, and commitment to the long-standing evidence. The overall post-launch evaluation over 18 month periods included program uptake data through quantitative and qualitative training feedback using the Workshop Evaluation Survey (WES), user-data analysis, and qualitative service and family feedback. A two-phase training evaluation and improvement process, over 8-10 month periods were completed. Following the initial 8 months, themes analyses was used to identify and address areas of weakness. Re-evaluation during the second phase measured the impact of improvements while informing future improvements.

Results:

In the first 18 months post-launch, 1014 professionals (702 facilitators, 312 assistants) accessed the training courses from four global regions supporting at least 3928 children/families. After 18-months, response feedback was positive with ratings indicating high relevance of training to their work at 6.54/7 (N=219, SD=0.88), acceptability of the content 5.95/7 (N=219, SD=1.07), and overall satisfaction with the training 6.07 (N=368; SD=1.04; See Figure 2). During the two-phased user-informed course enhancement period, ratings showed improvements across all feedback categories (See Figure 2) indicating useful changes were implemented. Themes analysis identified notable strengths including the combination of videos and interactive training process, completion flexibility due to self-paced training; and the structured and easy to navigate training platform.

Conclusions:

The outcomes to-date provide preliminary support to both the co-design methodology and resultant suitability of digitised self-paced professional training within a software-based social-emotional skills program to empower children’s resilience. Results include a swift uptake and feedback that aligned with overall project aims. Internal evaluations continue with phased reviews and program enhancements over time.

**428.404 (Poster) Accuracy of a 2-Minute Eye-Tracking Assessment to Differentiate Young Children with and without Autism, and Potential for Use As an Early Identification Aide**

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Background: Autism diagnosis relies on the potentially subjective appraisal of social-communication difficulties and behavioural inflexibility. **Gazefinder** eye-tracking technology—manufactured by JVCKENWOOD Corporation—was developed to support accurate and efficient autism identification and diagnosis, via a short 2-minute stimulus sequence and results processed and visualised automatically, for straightforward ‘off-the-shelf’ use. The animation sequence taps visual attention during referential attention trials (i.e., to pointed-at vs. distractor objects), preferential social attention (i.e., to eyes vs. mouth of a human face; and to people vs. geometry across a range of scenes), and biological motion (i.e., upright vs. inverted point-light displays). Previous studies—all conducted in Japan—suggest **Gazefinder** can differentiate people with and without autism in adolescence/adulthood (Fujikawa et al., 2016) and childhood (Fujioka et al., 2014), and Tsuichiya et al. (2021) have recently reported good accuracy for the differentiation of children with and without autism, aged 5-17 years (Tsuchiya et al., 2021).

Objectives: To independently trial the accuracy of **Gazefinder** to differentiate young children with and without autism, when diagnostic assessment often occurs in a high-resource setting (i.e., Western, majority English-speaking country), including appraising acceptability and safety for use in this context with children aged 2-4 years.

Methods: This pre-registered clinical device trial (ANZCTR12619000317190) enrolled 203 children aged 2 years 0 months to 4 years 11 months (M=3 years 6 months; SD=9 months) in two groups—children with a confirmed community autism diagnosis (n=102; 81% male), and controls with no parent-reported developmental concerns or close family history of autism (n=101; 57% male). Children completed the brief, standardised **Gazefinder** eye-tracking assessment. Parents provided socio-demographic information and clinical/behavioural phenotyping questionnaires. Further, mirroring a community diagnostic assessment experience, further clinical/behavioural phenotyping of children with autism included standardised direct assessments of autism presentation and developmental/cognitive abilities. Recruitment and data collection procedures were pre-registered, conducted by experienced clinical researchers, overseen by a data monitoring and
Adapting Emotiplay, a Computer Based Emotional Competence Intervention for Use in Special Classrooms for Autistic Children

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Background: Autism is characterized by Emotional Competence (EC) challenges: The ability to recognize and understand one’s own and others’ emotional states and to use emotional knowledge to initiate and preserve social relationships (Denham et al., 2015). Many interventions aiming to teach autistic individuals to recognize and understand emotions have been tested. Most focused only on facial expressions, were limited to autistic children with no intellectual disabilities (ID); and showed limited generalization to real social settings (Berggren et al., 2017; Eden & Oren, 2021; Petrovska & Trajkovski, 2019). EmotiPlay, a computer-based intervention program, designed to enhance emotion recognition (ER) by addressing multiple modalities of emotional cues (facial expressions, tone of voice, body language), has shown good outcome when used at home by autistic children and no ID (Fridenson-Hayo et al., 2017). However, the examination of generalization was partial and depended only on parental reports. The present study examined the adaptation and the integration of EmotiPlay into special education classrooms in regular schools.

Objectives: (1.) To examine the adaptation and integration of EmotiPlay’s intervention to a school setting with autistic children at various ages and levels of functioning. (2.) To pilot test an extended EC battery for EmotiPlay’s evaluation.

Methods: Participants included 24 Autistic children (4 Girls) aged 7-10 years (Mean=9.1, S.D.=1.20), and 19 neurotypical (NT) children (3 Girls) aged 7-9 years (Mean=7.9, SD=0.82). Groups were comparable on cognitive and language levels.

Autistic students participated in 16 weekly lessons over 3 months, that introduced emotions and taught emotion cues in the different modalities. Lessons were given by the form teachers. Qualitative data was collected via biweekly observations and teachers' interviews.

The EC battery tested with participants included: (1) multi-modal basic and complex ER (2) emotion understanding based on a standardized measure (the Test of Emotion Comprehension - TEC) (3) an emotion definition task (4) a story-telling task (5) an observation of children’s prosocial behavior during free-playtime (using the Playground Observation of Peer Engagement - POPE).

Results: Qualitative analysis of teachers’ feedback indicated an average of 6 activities per lesson, a decrease in motivation at didactic activities, and some difficulties understanding instructions at lower grades.

On the EC tasks, autistic children performed more poorly than NT children on complex, but not on basic, emotion recognition taks.

In addition, autistic children had significant lower scores on the TEC and the emotion definition task compared to NT children. No significant difference was found on the story-telling task.

Free-time observation (POPE) indicated that autistic children had fewer positive initiations and responses compared to NTs, and that they spent more time at solitary or as viewers, whereas NT children spent more time jointly engaged with their peers.

Conclusions: Considering these results, Emotiplay’s intervention was modified for school use: (1) Basic emotions lessons were shortened, and 3 complex emotions were added (bored, interested, shame). (2) story task to evaluate natural emotional vocabulary was altered to story retelling. These adaptations set the scene for a randomized controlled trial, evaluating EmotiPlay in schools.
Automatic Delineation and Classification of Head Movements Using 3D Accelerometer Data from Live Social Interaction

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Background:

Individuals with autism spectrum disorder (ASD) often show reduced non-verbal communication during social interactive encounters, e.g. facial expressions, deictic and communicative gestures, eye gaze. This includes reduced usage and expression of gestures of the head, such as nodding, shaking the head, and head turning. Diagnostic criteria of ASD suggest that reduced non-verbal communicative behavior is an important symptom, but current diagnostic tools are restricted to subjective, clinical evaluation.

While many tools for automatic delineation and classification of facial expressions and gestures from video data are available, less work has been done with respect to the usage of accelerometer sensor data. Considering the current lack of objective, quantitative measures of non-verbal behavior during social interaction, an automated analysis pipeline for movement annotation from accelerometer data would be helpful for both clinical evaluation and research.

Objectives:

We are developing a tool that allows for the semi-automatic annotation of specific head gestures, including nodding, shaking the head, and deictic head-turning. Ultimately, the tool will be used in an integrated setup for the quantification of social interactive behavior.

Methods:

We used video recording and a mobile eye tracking device during sequences of social interaction providing video data and synched accelerometer data. First, using dedicated algorithms for unsupervised automatic segmentation of movement from accelerometer data (Krüger et al., 2017), we identified segments of distinguishable head movements. Second, the algorithm was optimized for the detection of specific movement types using manual annotation of gestures as ground truth. Third, we will use supervised machine learning for direct classification of head movements from pre-segmented time-series data. Fourth, this automated annotation will be back-linked to video data to allow for the final evaluation of pre-annotations by a human observer, similar to available tools for video based gesture annotation (Ripperda et al, 2020).

Results:

Initial results using annotated data of 5 participants showed that head movements can be reliably segmented automatically, resulting in more efficient manual annotation of movement type, quantification of occurrence of communicative movement, and optimized segmentation for specific head movements such as nodding. Data collection in a larger group of 50 participants is ongoing and the results of the machine learning approach and usage of the automated pipeline for movement pre-annotation will be presented at the meeting.

Conclusions:

A (semi-)automated annotation tool for head gestures is a valuable research tool for the investigation of head movements, for both clinical evaluation and detailed analysis of non-verbal communicative behavior.

References:

Objectives: To develop and demonstrate an open-source interactive web-based visualization and pre-processing tool that can efficiently and accurately perform rigorous quality assessment (QA) on ambulatory ECG data, including identification and summarization of artifacts and missing data (Figure 1).

Methods: We evaluated our ECG QA tool using a 249.4 hour [M/SD: 2.4/0.6] dataset of ambulatory ECG recordings collected with the well-validated wireless, chest-worn Actiwave Cardio by CamNtech from one examiner and 34 parent-child dyads (23 TD [3.8yr|1.1], 11 ASD [4.1yr|1.0]). Dyas were asked to engage in various semi-structured social and emotional regulation tasks adapted from the ADOS-2 and Lab-TAB to quantify socio-affective functioning and interpersonal physiological dynamics. We simultaneously collected time-synchronized ECG recordings at 1024 Hz from the parent, child, and examiner during these tasks. Using our QA pipeline, we first segmented each person’s ECG data into 60-second windows. Next, we pre-processed the windows with a peak detection algorithm using MindWare HRV Analysis Software (version 3.2.11) to derive second-by-second values of heart rate (HR) and interbeat interval (IBI). We then filtered out invalid HR and IBI values outside the range of [30:220] bpm and trimmed the beginning and end of each person’s signal to the start time of the first task and the end time of the last task. Lastly, we computed the median IBI values in each 60-second window to estimate the expected HR for that window and compared this expected value with the detected number of peaks to calculate the percent missing.

Results: Overall, the average proportion of missing peaks per window (sample panel in Figure 2) for the TD group was 1.1|4.4% and 1.9|4.9% for the ASD group. Within the TD group, average proportions of missing peaks per window by task were 1.2/2.8% (Free Play), 1.2/3.1% (ADOS Presses), 1.3/2.4% (Frustration 1), 0.8/1.8% (Frustration 2), 1.1/2.1% (Keep Calm), and 1.1/2.4% (Reading a Book). Within the ASD group, average proportions of missing peaks per window were 2.3/4.0% (Free Play), 1.5/3.3% (ADOS Presses), 1.9/3.7% (Frustration 1), 2.2/3.5% (Frustration 2), 2.4/4.1% (Keep Calm), and 2.0/3.5% (Reading a Book).

Conclusions: We developed an open-source interactive web-based visualization tool that performs automated ECG QA by identifying artifacts and missing data. Increasing ECG data pre-processing accessibility, efficiency, and transparency could enable methodological reproducibility and lead to more reliable and valid inferences when ambulatory data collection systems are used.
Methods:

Using a mixed-methods approach (self-developed surveys and semi-structured interviews), this study draws on Technology Acceptance Model (TAM) to investigate parent, teacher, and autistic perspectives on the acceptability of ‘Wider Web’ features. All participants are based in the United Arab Emirates; a non-WEIRD (Western, Educated, Industrialized, Rich and Democratic) research context (heavily neglected in research literature). Parents and teachers will report on 4 groups of autistic students: pre-school (aged 5 and younger), children (6-12 years), teenagers (13-17 years), young adults (18-25 years), adults (26 and older).

Results:

Data collection commenced in November 2022, and is currently on-going, anticipating a reach of 50 participants in each of parent, teacher, and autistic student groups by January 2023. We are recruiting at the rate of 15 participants per month (per group), and expect to present group insights and differences in May 2023.

Conclusions:

This study also aims to consolidate parent, teacher, and autistic user feedback on the benefits, drawbacks and recommendations for improving ‘Wider Web - to support autistic users’ online needs and experiences. Findings will serve as a guidance to inform future learning and support technology design for autistic users.
Results: We present our initial results indicating that our prototyped design changes would be beneficial for this community. For example, one Autistic participant felt the Friend Request Guide was useful because it required users to evaluate their current offline relationship with the requester: “That first prompt is actually really, really smart. I like the first wave of verify your connection to them.” Such responses indicate that this can be a useful tool for correctly classifying a potentially dangerous relationship with a stranger rather than interpreting a Friend Request as being a way to gain a friend (which was a common pitfall based on our interview analysis).

Conclusions: By identifying the problematic design elements of social media, we help researchers and stakeholders recognize potential pitfalls of social media. By also identifying new design elements that overcome these problematic designs, we take a first step in providing design guidance for social media designers.

428.410 (Poster) Online Training for Executive Functioning Challenges Intervention for Implementers Working with Elementary Students with ASD/ADHD

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Background: Executive function (EF) challenges, including difficulties with flexible thinking, goal setting, and planning, are common in ASD and ADHD and are related to negative outcomes, such as academic problems, oppositional-defiant symptoms, adaptive skills deficits, anxiety, and aggression. Chronic exposure to poverty is also predictive of EF challenges. School-based EF interventions provide an equitable service delivery system for children across the socio-economic spectrum, addressing the economic disparities in access to clinic-based treatment for children with ADHD or ASD. Reviewers have called for expansion of cognitive-behavioral treatment for ADHD and ASD, specifically treatments that target EF, but the evidence for them is limited in school settings. Unstuck and On Target! (“Unstuck” or “the curriculum”) is a school-based curriculum that targets EF.

Objectives: Develop and evaluate an online continuing education training for professionals who work with elementary students with EF challenges.

Methods: The Unstuck authors partnered with an instructional design (ID) team to create an asynchronous online training based on their existing, in-person training. The ID team, using best practices in adult learning and cybergogy, adapted the curriculum into an interactive course, featuring voiceover, images, videos, animations, reflection questions, and resources. The ID team engaged the authors, stakeholders, and cultural competence experts in multiple rounds of feedback. Section 508 and WCAG AA compliance requirements were incorporated into the training. Implementers (N=281) from Virginia (n=138) and Colorado (n=143) were recruited. Participants were 93.6% female, 90% White, 20-80 years old (M = 40.48, SD = 10.88). They had 0-35 years of experience (M = 11.35, SD = 8.28) as General (10%) or Special Ed teachers (34%), School Psychologists (19%), School/Guidance Counselors (17%). Public and private schools were included.

Results: After completing the online training, participants overall felt the five learning objectives were achieved (M=4.32, SD=0.692, range: 1-5), approved of the e-learning format (M=4.51, SD=0.63, range: 1-5), and indicated that their knowledge of the issues/needs of their students had increased (M=3.99, SD=0.688, range: 1-5). Qualitative feedback was overwhelmingly positive: “This is one of the first trainings where I feel like the creators truly practice what they preach - you made things paced, checked for understanding, were clear in learning targets, acknowledged roadblocks, made the materials fun, relevant and engaging, and overall rocked the whole process. I wish more of my trainings were this user friendly and relevant.” Participants specifically identified the case studies, printable resources, and application of the GWPDC framework as useful. Participants requested handouts on which they could take notes and more videos of teachers implementing Unstuck.

Conclusions: Overall, participants found the curriculum to be useful. Despite occasional technological issues, participants approved of an online training because they could complete it at their own pace and on their own schedule. Where possible, participant feedback was incorporated into an update of the training (released to the public following the pilot), including fixing technical glitches and the addition of page citations where tools in the Unstuck manual were referenced. Online training adaptations of the curricula for high school students are currently being produced.

428.411 (Poster) Oto, a Compressive Armchair to Perform Deep Pressure in Children with ASD: A User-Centered Design

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Background:

Deep Pressure Therapy (DPT) is widely used in autism spectrum disorder (ASD) but evidence of its efficacy is limited and some technics raised acceptability and stigmatization issues.

Objectives:

To design a usable, non-stigmatizing compressive armchair easily controlled electronically by the user

Methods:

We used a user-centered design process (Witteman et al., 2021, JMIR) and assessed the usability of the device (System Usability Scale, Bangor, 2008) among professionals, users in Excellence center day Hospital in ASD children in France for one year. We measured time of use as a measure of usage in practice of the device.

We collected feedback from a convenience sample with severe forms of ASD and intellectual deficiency and their psychometricians.

Results:

We developed an armchair with 4 different cells, controlled electronically by an Arduino card. They can be inflated to induce tailored pressure on the body. The pressure is recorded electronically, and can be limited with a maximum threshold tailored for each individual with an electronic tablet.

The design was user-centered. It was used weekly for 15 months long among 29 patients for 3-20 min each, a total of 72.5 hours.

The armchair is less stigmatizing and less bulky than the original hug machine. Performing sessions with the chair and with a medical-grade wearable device is feasible.

The Usability (System Usability Scale), measured among n=9 professionals (psychomotricians, nurses, educators) was between good and excellent.

The armchair takes less place than the hug machine. Performing sessions with the chair is feasible.

We collected positive design acceptability feedback from several stakeholders (patients, families, design prizes school of wood, James Dyson Design Award, Great Hope Prize Saint Pierre Fundation).

Conclusions:

This device opens perspective for controlled evaluation of deep pressure therapy to treat anxiety in ASD. The device allows to assess efficacy of deep pressure therapy in ASD and underlying physiological mechanisms. A pilot efficacy study was funded and is under preparation.

**428.412 (Poster) Scalable Transdiagnostic Early Assessment of Mental Health (STREAM): Developing a Tablet-Based App to Assess Early Child Development in Low-Resource Settings**

Background:

It is estimated that 95% (50.2 million) of children with developmental disabilities reside in low or middle-income countries (Olusanya et al., 2018). This burden is exacerbated by the scarcity of skilled professionals for early detection of neurodevelopmental disorders (NDDs), and their skewed distribution to urban, often private, clinics, as well as their reliance on time-intensive, specialist-dependent, proprietary assessment tools. To address these issues, it is crucial to develop a portable tool to assess neurodevelopment, that is applicable across diverse cultural settings and can be administered by non-specialist workers (NSWs) with little training.

Objectives:

The main objective of the STREAM project is to develop and validate an open-source, scalable assessment tool in the form of a tablet-based app, that can be administered by NSWs to assess the neurodevelopmental status of children and identify those at-risk of NDDs.

Methods:

This project is funded by the Medical Research Council UK and is an interdisciplinary collaboration between neuroscientists, statisticians, public health researchers, and computer scientists from nine institutions across four countries (India, Malawi, USA, and UK).

Through a process of expert consensus workshops and iterative pilot testing, STREAM has adapted and combined three existing tools, assessing social, cognitive, and motor abilities of children aged 0-6 years, into a unified, tablet-based app. The tools included in STREAM are: 1) MDAT, an observational and parent-report checklist that assesses gross motor, fine motor, social, and language abilities (Gladstone et al., 2010); 2) DEEP, a series of gamified tasks assessing cognitive abilities (Bhavnani et al., 2019); 3) START, a series of gamified tasks assessing social preference, sensory preference, and motor abilities (Dubey et al., 2022).

The platform is currently being tested on N=4000 children from community and NDD-risk samples across India and Malawi. STREAM will be validated against a gold standard measure of child development (Griffiths Mental Development Scales; Griffiths, 1970).

Results:

The STREAM app incorporates gamified tasks, observation checklists, parent-report, and audio/video recordings, to assess abilities relevant to the domains of social, cognitive, and motor development. Each task within STREAM has been designed to be culturally agnostic. A key feature of the app is its ability to work offline, enabling administration in the field without the need for additional infrastructure. The presentation will include a live demonstration of all aspects of the app. At the point of this submission, STREAM has been tested on N=1226 children from community and NDD-risk samples in India and Malawi, with a mean completion rate of 97% across all tasks.

Conclusions:

The working STREAM app and high proportion of data completion demonstrate the feasibility and acceptability of a portable platform administered by NSWs for assessing child development in low-resource settings. The metrics derived from the app will be validated against a gold-standard measure of child development and assessed in terms of their ability to highlight the role of social, behavioural, and neural risk factors known to impact development.

428.413 (Poster) Stories Online for Autism (SOFA-app.org)

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Background:

Social stories is a widely-used and acceptable intervention for autistic and broader autism communities. However, variability in the development and delivery of social stories has resulted in mixed findings regarding the effectiveness of the intervention. The SOFA-app (Stories Online For Autism) is a free online digital application, for smart devices (Android/IOS smartphones or tablets), through which social stories can be developed and delivered. The SOFA-app was co-developed with the autistic and broader autism communities, and supports authors (i.e., individuals writing social stories) with creating and delivering stories reliably and effectively, and delivers the social stories in a personalised manner to the audience (i.e. individuals reading social stories). The SOFA-app comprises features aimed towards increasing procedural integrity and intervention fidelity by focusing on goal-setting, goal-rating, and goal-monitoring.

Objectives: To demonstrate the fully-functional (and free) SOFA-app.
Methods:

The SOFA-app can operate in two modes (see Figure 1): The writing mode and the reading mode. The writing mode is where authors develop their stories by using a well-defined, intuitive, and user-friendly writing interface. The writing interface supports (see Figure 2) the author to write appropriately structured social stories. The author rates the extent to which the audience has reached the goal of the social story (from 0 to 10). The reading mode is where individuals may access, view and/or read stories, and includes a text-to-speech function. The SOFA-app includes a fill-in-the-blank comprehension check at the end of each story that has been read. The SOFA-app also includes a feature that aims to encourage story evaluation from the audience’s perspective.

Thus, the SOFA-app provides the opportunity to easily tailor a social story for the audience, and in so doing encourages further engagement with the audience’s perspective. This is also achieved by using photos that are taken by the author on their personal smartphone which are stored in the device’s image gallery. This feature enables authors to include real images of people, objects, and settings in their social stories. The application’s social story library can be used to store and shared stories with the SOFA-app community. In this manner, the autistic and broader autism communities are encouraged to share their social stories and thus collaborate indirectly with other users.

Results:

2331 users have downloaded the SOFA-app. 160 social stories have been shared in the story library. Multiple studies have shown significant increases in ‘closeness to goal ratings after using the SOFA-app. Closeness to goal ratings from the autistic and broader autism communities are typically around 2-3 at baseline and typically significantly increase over 4 points to around 6-7 after the social stories support, which constitutes a large effect size.

Conclusions:

The SOFA-app has enabled the autistic and broader autism communities to develop social stories effectively. This not only empowers the autistic and broader autism communities, it addresses issues of variability in the development and delivery of social stories that have compromised previous research into the effectiveness of social stories.

428.414 (Poster) Using an Autonomous Robot to Detect Presence of Eye Gaze of Autistic Children
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Background: Autistic individuals have difficulties establishing eye contact and joint attention with others. Previous studies have examined whether social robots improve eye contact and / or joint attention of autistic individuals, but have yielded mixed findings (e.g., Chung, 2021; Zheng et al., 2020). One limitation is the robots deployed were controlled by humans (i.e., under a Wizard-of-Oz paradigm), which impose constraints in applying robots to the clinical settings.

Objectives: The present study thus deployed a social robot that could detect the child’s eye gaze, prompt and praise the child autonomously within established scenarios, alter behavior on the basis of parameters specified by the programmer, and process sensed data over time to understand the history of the interaction.

Methods: An autonomous social robot, Humane, which has been used in autism and eldercare (Khosla et al., 2015; So et al., 2020; revision under review) was deployed. Humane, 25 cm tall and 3.2 kg weight, has human attributes include baby face-like appearance and voice vocalization (see Figure 1). Humane was installed with the NeoFace® Face Recognition function that autonomously detected the focusing of child’s gaze and did not require the remote control of human beings. Such eye gaze detection function operated under the Multi-modal Machine Learning System (MMLS), which constructed predictive models for eye gaze detection using search methods, artificial intelligence, and mathematical modelling (see Figure 2).

We conducted a pilot study on 32 autistic children aged 3 to 15 (26 males; IQs ranged from 50 to 140; ADOS-2 comparison score ranged from 4 to 10). In this study, each child was introduced Humane and instructed to sit one meter away from Humane (see Figure 3). When Humane was narrating stories and recognizing that the child was not looking at it for a preset interval, i.e., five seconds, Humane would stop the story narration and prompt the child, “Child, eyes on me please!” or “Child, please look at me!” When the child looked back to Humane in one second after receiving the prompt, Humane would praise him/her, “Good looking! Well done!” or “You have done a good job! Thanks for looking at me!” Then Humane resumed narrated and eye gaze detection program. Otherwise, Humane prompted the child again after 1 second. Each training lasted for 10 minutes, once per week, for four weeks. Fidelity check was conducted.

Results: The number of prompts Humane produced (i.e., the number of times Humane detected that the child did not look at it) was positively associated with the child’s autism severity (r=.34, p<.03) and negatively associated with his/her social responsiveness (r=-.33, p<.03). Additionally, the number of prompts in the last training session was significantly smaller than that in the first training sessions.
suggesting that autistic children required few prompts by the end of training, \( t(31)=3.34, p<.002 \). Parents rated their children’s eye contact improved after training too, \( t(31)=-2.23, p=.03 \).

Conclusions: Humane can effectively detect the autistic children’s eye gaze and its detection is associated with autism characteristics. This program can also significantly improve their eye contact.

428.415 (Poster) Web-Based Collective Science Project: Collect Data with Autistics People in Accordance with FAIR and Gdpr
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Background:

Researchers in experimental psychology face numerous challenges, including technological limitations and reglementary compliance issues, that hinder the collection of scientific data, its management, its dissemination, and its reuse.

Objectives:

This study aims to provide researchers with a remote research web-based application called Collective Science. This application is specifically designed to be used in experimental psychology research on autistic cognition, while respecting the life cycle of research data: from collection and storage to sharing and reuse.

Collective Science also highlights modern research qualities and sharing practices such as necessity creation, FAIR principles, GDPR standards as well as free access.

Methods:

The expected research solution must represent heterogeneous and complex information (data from researchers, data from participants, and transformed data from experimental tasks, video games, and surveys). This data should face the challenges of transparency, rigor, and reproducibility, in addition to protecting autistic people’s sensitive data. We opted for an API-first architecture with micro-services to create ecosystems that collect and treat modular (with eight modules: joint capture) and reusable data to support open science.

Our solution is also based on anonymous authentication to guarantee compliance with GDPR standard requirements. We have been attentive to provide study participants with answers to questions such as: Who will have the authorization to access this data? Where will it be stored? For how long? What treatment the date is subjected to?

It is essential for us to be able to ensure the sovereignty of participants over their personal data and to avoid them the risks associated with potential identification in the event of a confidentiality breach. From the perspective of research teams, it is very important to proactively guard against such risks, if only because it is a prerequisite of many funding programs.

Results:

As of today, a functional prototype is online. We are currently working on user experience design in order to collect test user data as a proof of concept.

Conclusions:

The Collective Science V.2 project in its current version allows the integration and posting of experimental psychology video games and the collection of non-identifying data in accordance with European regulations (GDPR). The Collective Science system is intended to be free and to facilitate citizen involvement in the production of scientific knowledge. Its availability to the scientific community will make it possible to produce protocols with a little fee or free, to pool experimental tasks, to get feedback from people with autism, and to facilitate the replication of experiences. The purpose of Collective Science is to offer a space for experimentation, where the opinion of the autistic person can be heard.
Panel Chair: Laurent Mottron, M.D., Centre de recherche du CIUSSS-NIM, Montréal, QC, Canada

Discussant: Dermot M. Bowler, Autism Research Group, City University, London, UNITED KINGDOM

**207.001 (Panel Discussion) Anchoring Autism Spectrum Heterogeneity in a Universal, Temporally Bounded, Recognizable and Distinct Prototypical Autistic Phenotype**
*L. Mottron, M.D., Centre de recherche du CIUSSS-NIM, Montréal, QC, Canada*

**Background:** The evolution of autism delineation and diagnostic instruments has been paralleled by a steady increase in autism prevalence and heterogeneity. A categorical diagnosis of autism spectrum disorder is now consistent with large variations in language, intelligence, comorbidity, and severity, increasingly distant from the initial prototypical descriptions. In clinical settings, emphasis on diagnostic reliability has sacrificed specificity and led to confounding autism with the entire range of neurodevelopmental conditions and personality variants. In intervention settings, a diagnosis of autism is now too vague to inform on the type of support required by the diagnosed individuals. In research, the inclusion of individuals categorically defined by over-inclusive, polythetic criteria results in cohorts of people less and less different from the general population. It results in an inability to find differences between the autistic and general population, and to detect mechanistic differences. Here, we propose a radical change in the status of autism among other human developmental variants, ensuing definitional criteria, and research methodology and program.

**Objectives:** We propose to extract autism from psychiatric or neurodevelopmental disorders, and group it with phenomena such as twin pregnancy, left lateralization, and breach birth, each of which represents the less-frequent branch of a developmental bifurcation. Ultimately, the phenotypic, developmental, and etiological boundaries of autism vis-à-vis typical development would result from whether or not incoming information is processed in a socially biased manner, at the time where humans integrate language. Alternatives in a polarized, two-solution-only problem would determine its almost categorical nature in its prototypical form, the polarized structure opposing negative social signs to positive non-social signs, and its familial occurrence at the same rates in all humans.

**Methods:** We propose new diagnostic criteria for “prototypical autism” at the preschool age, as a necessary step toward a re.foundation of autism research. These criteria include: a) a prototypical, bayonet-shaped developmental trajectory, b) a prototypical presentation at preschool age, combining an absence of social bias with an enhanced role, autonomy and performance of perception, c) the absence of deleterious neurological and genetic pathogenic markers, and d) the presence of non-deleterious markers: familial transmission through common variants, sex ratio and macrocephaly.

**Results:** in the absence of biomarkers for diagnosis, clinical expertise should have the precedence over “satisfying criteria”. Focusing on the study of a positively and negatively defined category, including characteristics of trajectories, based on their expert-judged prototypicality, should advance the theoretical and practical issues pertaining to autism diagnostic thresholds. Grounding biomarker search on a prototypical cohort defined by specific ranges of values for the clinical specifiers should allow retesting the generality of neurobiological results previously acquired. This would allow the distinction of true heterogeneity (for example that of different outcomes in adulthood despite similar presentations at preschool age) from top-down, criteria-based heterogeneity resulting from diagnostic confusion.

**Conclusions:** One should distinguish between the populations on which research is carried out and the populations to which we provide support. People must receive services according to their individual needs, and not according to the name or certainty of their diagnosis.

**207.002 (Panel Discussion) Effects of Permutations and Combinations of Causal Factors Can Make Something Homogeneous Appear Heterogeneous**
*J. N. Constantino, Children's Hospital of Atlanta, Atlanta, GA*

**Background:** We are in an era in which a diversity of human neuropsychiatric conditions, codified by hundreds of DSM5 diagnoses, are proving to have large components of genetic overlap with one another, and to be mediated by a highly parsimonious latent trait structure (eg. the effects of the so-called p factor). The apparent heterogeneities of autism, for which a vast share of the population-attributable risk for can be traced to inheritance, may reflect a similar architecture. A growing number of studies over the past decade have indicated that inherited susceptibility may operate through a finite number of early developmental liabilities that, in various permutations and combinations, jointly raise liability for a convergent syndrome of variation in social communication that, at the clinical extreme, defines autism.
Objectives: In this presentation, this body of research will be synthesized to elucidate a developmental substructure for autism spectrum disorder (ASD), which would account for many aspects of presumed heterogeneity of the condition. This framework has profound implications for ongoing discovery efforts to elucidate the neurobiological causes of ASD and can inform the search for biological markers as well as novel approaches to personalized intervention.

Methods: It is now hypothesized that autism heterogeneity can be decomposed into three components: (1) the downstream off-target effects of a given contributing cause (eg. hyperactivity or variation in motor coordination); (2) variation in the “severity” of autism along an otherwise-homogeneous continuum; (3) additional “off-target” effects of amplifiers of impairment in adaptive functioning (eg. the medical or cognitive impacts of a chromosomal rearrangement, or exacerbations of impairment in adaptive functioning incurred by common, genetically-unrelated neuropsychiatric conditions such as PTSD or a cycling mood disorder).

Results: Viewed this way, heterogeneity in autism itself may be more apparent than real, and efforts to parse heterogeneity should focus on (and control for) the effects of 1 and 3 above; conversely, heterogeneity should not be invoked for autism until / unless these parameters are rigorously controlled for. Moreover, very recently, it has been discovered that variation along the severity continuum (2 above) may be determined, in part, by stochastic influences on early brain and behavioral development, which may account for previously-unexplained effects of “unique environmental influences”, not only on the severity of autism, but on that of many neuropsychiatric conditions (schizophrenia being a prototypic example).

Conclusions: The possibility that vulnerability to stochastic influences constitutes a general biological feature or signature of neuropsychiatric liability presents additional new opportunities for understanding variation in outcome, and highlights the importance of exploring the timing (and potential interruption) of these critical factors, which (preliminarily) appear to induce progressively higher levels of clinically-meaningful variation as the total burden of causal influence rises.

207.003 (Panel Discussion) Employing Neuroscience Approaches to Understand Heterogeneity in Autism and across Neurodevelopmental Conditions
E. Anagnostou, Autism Research Centre, Bloorview Research Institute, University of Toronto, Toronto, ON, Canada

Background: Conceptualizing autism as a distinct entity / condition is based on the observation of shared traits, and evidence of their heritability. Still, autistic individuals experience divergent developmental trajectories, not only characterized by differences in severity of “core” traits, but also the presence, in many, of cognitive, behavioral and other developmental differences, as well as physical and mental health concerns, often presumed to be simply co-occurring.

Objectives: We propose that autism, as currently defined, includes a variety of biological conditions, which may share social communication differences and repetitive behaviors, but are much more complex with respect to behavioral/cognitive and body differences and their trajectories.

Methods: To support the proposition, we use neuroimaging and genomic studies to attempt to highlight convergent pathways supported by genomics within autism and across neurodevelopmental conditions (e.g. Trost et al 2022, Zarrei et al 2019), identify biologically distinct and similar groups based on brain structure and function (e.g. Vandewouw et al 2023), and examine whether behavioral traits measured across neurodevelopmental conditions support existing classifications. To further support the thesis, the data will be positioned within other large studies of biology and long-term outcomes.

Results: Biologically defined conditions lead to a variety of behavioral / cognitive/ other differences, and individuals with distinct labels of neurodevelopmental differences, may in fact experience biological similarity.

Conclusions: Understanding the diverse pathways to autism, as currently defined, the overlap with other neurodevelopmental conditions, as well as the diverse biological trajectories and the factors (biological or not) that influence them, is critical to our understanding of neurodiversity, and opportunities to employ precision health principles to support autistic and other neurodivergent individuals across the lifespan.

207.004 (Panel Discussion) Autism As Emergent and Transactional
J. Green, University of Manchester, Manchester, United Kingdom

Background: I approach current challenges in the conceptualisation of autism by considering autistic states as i) an emergent property against the background of dimensional neurodivergence; and ii) transactional, as the neurodivergent brain, mind, and body encounter their social and physical environment within early development (Green 2022). Evidence supporting this proposition comes from a sequence of randomised intervention trials based on transactional development theory, in the infancy pre-diagnostic prodrome and early post-diagnosis.
Objectives: To consider four RCTs of transactional parent-mediated therapy which used a blinded measure of the autistic phenotype (ADOS/AOSI) as primary outcome. Three included long-term blind-assessed follow-up analysed with ITT and ‘area between curves’ representing cumulative effect of intervention over time (see Figure 1).

Methods: The therapies (PACT/iBASIS) work with parents to help their awareness and understanding of the communication style and intentionality of their neurodivergent child; in consequence improving the accuracy, sensitivity, and contingency of their dyadic responses. The young autistic child responds in turn with increased response and communication initiation.

Results: Initial RCT of the PACT intervention (Aldred et al 2004; N=28) compared to usual care altered the outcome child ADOS total score [F.1:25/ = 7.30; p = 0.01]. Larger PACT RCT (Pickles et al 2016; N=152) altered the (dimensional) ADOS “combined severity score” (CSS) at endpoint, with sustained effect over the next 6 years [marginal log-odds effect size 0.55 (95% CI 0.14–0.91; p = 0.009), Figure 1 bottom panel]. Both samples included children with substantial autism and ID. Increased child social engagement and initiation mediated the endpoint and follow up ADOS effects (Figure 2).

RCT of the iBASIS intervention (Green et al 2017; N=55), from 9 months in infant-siblings at elevated likelihood of autism, showed cumulative effect to reduce dimensional AOSI/ADOS scores over intervention and 2 year follow up (Figure 1 top panel). These results were replicated with community sampling for developmental concerns at 12 months (Whitehouse et al 2021; N=103; Figure 1 middle panel). In the latter trial, independent clinical diagnosis at 3 years showed a 67% reduction in emergent categorical autism (20.5% in TAU against 6.7% in iBASIS); odds ratio 0.18 (0–0.68; p = 0.02), while the children remained neurodivergent in other ways.

Conclusions: Across a range of child autism and developmental delay, targeted alteration in the quality of social transactional environment available for the child leads to significant, sustained alterations in dimensional autistic traits across both social communication and RRB/sensory domains; and, in one trial, to a linked reduction in independent clinical categorical classification. This linking of altered dimensional characteristics to clinical categorical emergence supports the idea of autism as an emergent property and its degree of malleability to altered social environments.

The results also thus enlarge our conceptualisation of the autism phenotype, to include both individual biology and the social environment in transactional relation. This may challenge essentialist views, for instance of intrinsic autistic “social avoidance”; integrates dimensional and categorical perspectives; and is consistent with the lived experience of autistic people and their advocacy for improved understanding within a social model.

Panel Discussion — Timely Topic Panel

213 - Inclusion in Research on Early Identification and Intervention: Finding the Common Ground

Panel Chair: Mayada Elsabbagh, Neurology and Neurosurgery, McGill University, Montreal, QC, Canada

Discussant: Rosa Hoekstra, Department of Psychology, Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, UNITED KINGDOM

213.001 (Panel Discussion) Autism Voices: Capture and Inclusion of First Person Perspectives
M. Elsabbagh, Neurology and Neurosurgery, McGill University, Montreal, QC, Canada

In recent years much progress has been made to enhance inclusivity in autism research. These efforts centre around the integration of lived experience, priorities, and preferences of various groups in the research process. Despite this progress, the first person perspectives of equity seeking groups remain underrepresented. The roots of exclusion in research are likely common across equity seeking subgroups, and include historical and ongoing biases, systemic discrimination, and structural inequality. However, improving this situation requires a thorough understanding of the barriers to inclusion which vary by field of research, target groups, and specific research and/or community contexts.

The presentation will showcase three case studies where significant adaptations to conventional research approaches improved inclusivity by enhancing the capture and/or integration of lived experience in research. Case 1, in the area of biomarker discovery, focused on development of meaningful measures to monitor the impact of genetic testing on the experience of families in routine care. Case 2, in a longitudinal cohort study enabled capture of first person perspectives of autistic children and youth across the spectrum, on outcomes and aspirations for the future. Case 3, in the area of early intervention focused on expanding access to services and supports in underserved communities through a co-designed clinical trial.
Taken together, these cases illustrate the need and the potential for adapting research approaches to enhance inclusivity. Systematic exclusion of equity seeking groups leads to questionable validity and generalizability of research findings. In contrast, it is hoped that inclusive research will generate solid findings with high potential for impact in society.

**213.002 (Panel Discussion) Partnering with Stakeholders in Intervention Science: Advancing Implementation and Effectiveness**

*S. Y. Shire, Special Education and Clinical Sciences, University of Oregon, Eugene, OR*

The traditional pipeline of clinic to community trials can take decades before practices are in use in the community. Rather, testing interventions within the real-world settings where the services will ultimately be provided and designing for community deployment can decrease the research to practice timeline (Weisz et al., 2004). Community Based Participatory Research (CBPR: Minkler & Wallerstein, 2003) can bring together the experience and joint goals of community and scientific leadership to examine the critical questions. Although many early intervention programs have demonstrated efficacy, fewer have demonstrated effectiveness when delivered in community practice. Community partnerships are critical to the development of effectiveness trials serving all children in public programs.

To describe a series of CBPR projects focused on the development, adaptation, testing, and deployment of a social communication intervention for young children with autism spectrum disorder (ASD) in public early intervention systems in North America.

Project 1 includes two studies where the goals and needs of the community as identified by leadership, practitioners, and caregivers led to testing of two implementation strategies to support practitioners’ learning of a social communication intervention in a hybrid type 1 effectiveness-implementation (Curran et al., 2012) randomized trial. To increase the reach to the region’s underserved communities, this was followed by a pilot concurrent multiple baseline study of remote caregiver coaching strategies delivered by community clinicians.

Project 2 incorporates the Active Implementation Framework (AIF: Metz & Bartley, 2012) to guide the iterative design of a technology-assisted adaptive caregiver-mediated model of the JASPER (Joint Attention, Symbolic Play, Engagement, and Regulation: Kasari et al., 2021) intervention. AIF Stages 1 and 2 focus on formative program development. A development team of EI stakeholders guided the first program iteration and staff training protocol. The program was then user tested by caregivers and practitioners using think-aloud interviews and completion of the System Usability Scale (SUS: Sauro, 2011). The revised program is currently being tested in a randomized trial. The trial will explore the acceptability, feasibility, and adoption of two adaptive implementation strategies to support caregivers’ strategy implementation.

Project 1 demonstrated significant gains for all practitioners over time but no significant differences between implementation strategies. The multiple baseline study demonstrated effects for caregivers’ strategy use (Tau-U=.95-1.0) and children’s social engagement (Tau-U=.94-1.0). We are currently exploring the sustainment of the practices in the province. These results informed Project 2.

In Project 2 we developed online intervention materials that was scored as “good” (scores in 80s on SUS) by stakeholders and revised the program based on their think-aloud feedback to be used in a randomized trial.

Together, these studies demonstrate that community stakeholders and researchers can team to collaboratively develop research questions and implement randomized trials that can explore both intervention effectiveness and real-world implementation. Current projects will continue to engage stakeholders including families who will have the opportunity to use the full online program. Their feedback will support a further refined iteration of the program that can then be culturally and linguistically adapted to support additional communities.

**213.003 (Panel Discussion) Identification and Intervention for Autism and Related Conditions in Humanitarian Settings**

*R. Nasir, Imperial College Healthcare NHS Trust, London, United Kingdom*

 Millions of children globally are impacted by humanitarian emergencies (armed conflict and natural disasters). Recent figures estimate that 175 million children globally are affected each year by natural disasters and 449 million children live in a conflict zone. Within this population, children with autism and related conditions are at further risk for poor outcomes related to health, mental health, physical injury and maltreatment. Little is known about these children and best practices to identify and support them. As the number of persons experiencing humanitarian emergencies soars globally, there is increasing evidence that individuals with autism and related conditions in humanitarian settings are at higher risk to experience adverse outcomes.

The presentation will offer a clinician and advocate perspective on what is known about autism and related conditions in humanitarian settings, the impact of trauma and other comorbidities, and examples of efforts to address this important gap in humanitarian action with particular emphasis on the role of the research community. Additionally, I will conver outcomes from the INSAR SIG on Autism and Related Disorders in the Context of Humanitarian Emergencies that was convened over three years from 2019-2021. The SIG identified key challenges and gaps including: (1) the lack of epidemiological data (e.g., prevalence, comorbidity and impact of trauma); (2) limited understanding of cultural and contextual factors that impact presentation, identification and access to services; (3) limited evidence-base for interventions in the humanitarian setting; (4) limited resources (e.g., funding, trained professionals, infrastructure) for research and clinical care; (5) the low priority and limited voice of those with autism and related conditions in this setting.
Potential solutions were also identified including: (1) empowering and engaging local professionals, and at-risk individuals/caregivers in capturing new and existing data; (2) involving local partners in capacity building (increasing knowledge and skills), including advanced crisis planning; (3) expanding research initiatives to low-resource humanitarian settings (e.g., WHO Caregiver Skills Training Programme); (4) effective use of technology to improve training communication, coaching and supervision of local partners and (5) learning from existing models of academic research in humanitarian settings. Key overarching approaches include multidisciplinary collaboration among stakeholders to improve implementation approaches; and sustained, targeted advocacy and coalition building within the autism community, professional societies, and governmental, nongovernmental, intergovernmental and humanitarian organizations.

Autism and related conditions represent a large, underserved population globally. Extant literature is limited and documents higher risk of adverse outcomes. Further research is needed to drive policy and interventions. There are existing models of academic research collaborations in humanitarian settings that may be relevant to researchers in the field of autism and related conditions.

213.004 (Panel Discussion) Participatory Methods for Autism Intervention Science  
*S. Fletcher-Watson*, Salvesen Mindroom Research Centre, University of Edinburgh, Edinburgh, UNITED KINGDOM

In this talk Sue will consider the dangers that can arise when autism community members are not involved in the intervention development, evaluation, implementation and personalisation pipeline. She will specifically address risks for the early intervention literature, and give examples of participatory research methods that can be used to deliver evidence-based practices that are fit for purpose and that the broad and diverse autism community can get behind.

### Translational Neuroscience

#### PANEL DISCUSSION — TRANSLATIONAL NEUROSCIENCE

**210 - Using Electrophysiology to Derive Translational Phenotypes in Genetic Models of Autism**

**Panel Chair:** Emily Jones, Centre for Brain and Cognitive Development, Birkbeck University of London, London, United Kingdom  
**Discussant:** Sarah Lippe, Neurosciences of Early Development Lab, CHU Sainte-Justine, Montreal, QC, Canada

Improving outcomes for autistic people requires sensitive biomarkers that can be used to predict prognosis and identify target engagement with relevant neurobiological pathways for new medicines. One relevant neurobiological mechanism is alterations in the relative balance of excitatory to inhibitory activity in sensory regions of the brain (E/I balance). Using EEG to measure E/I balance has strong potential for translation because it can be used across the lifespan and across species. Here, we present new data on candidate EEG markers of E/I balance across phylogenetic and ontogenetic levels. Cooke shows that the two classes of inhibitory neuron produce different EEG phenotypes within cortical layer 4, indicating the importance of considering heterogeneity within the inhibitory pathway. Tye shows that infants with TSC (a mutation affecting I/E balance) show alterations in the latency of basic sensory responses. Carter Leno shows that an EEG index of E/I balance relates to sensory differences in infants with a family history of autism. Finally, Lippe shows converging evidence of alterations in gamma-frequency rhythms in children with idiopathic and syndromic forms of autism that impact E/I. Taken together, EEG shows promise for the identification of disruptions to E/I balance in autism.

**210.001 (Panel Discussion) Biomarkers of Cortical Inhibition and Disinhibition Accompanying Habituation and Novelty Detection over Different Timescales**

F. A. Chaloner, C. Gelegen Van Eijl, A. Lawson and S. F. Cooke, (1)Centre for Developmental Neurobiology, Institute of Psychology, Psychiatry and Neuroscience, King’s College London, London, United Kingdom, (2)Department of Basic and Clinical Neuroscience, Institute of Psychology, Psychiatry and Neuroscience, King’s College London, London, United Kingdom, (3)Kings College London, London, United Kingdom

Background: Habituation enables organisms to suppress behavioural response to neutral stimuli and devote energy and attention to stimuli that reward, punish or are novel and therefore have the potential to deliver either. It is a fundamental form of cognition that lays the foundation for higher order cognition and is often disrupted in neurodevelopmental disorders such as intellectual disability (ID) and autism spectrum disorder (ASD). Given that habituation is manifest early in sensory processing, it serves an equally important role in mice and humans. We have developed a range of assays to measure habituation and novelty detection in mice over a range of timescales to develop deeper understanding of mechanisms at play in health and disorder.

**Objectives:**
Here we will describe response dynamics in primary visual cortex (V1) across different timescales of visual habituation to phase-reversing sinusoidal grating stimuli. We will further discuss the interventional approaches taken to understand core molecular mechanisms and key circuit motifs that support habituation and novelty detection in the neocortex across short and long timescales. In addition, we have modelled disruptions of those mechanisms in neurodevelopmental disorders originating from known genetic causes, including Fragile X Syndrome and Tuberous Sclerosis Complex.

Methods:

Behavioural analysis, single unit recordings, local field potential recordings, electroencephalogram (EEG), optogenetics, chemogenetics and genetic knockdown in mice.

Results:

We have found that, visual-evoked potential (VEP) responses recorded in layer 4 of V1 undergo trough-peak depression during short-term visual habituation within a single recording session, consistent with theories of habituation as a form of adaptive filtration. By contrast, long-term habituation is accompanied by a paradoxical sleep-dependent form of response potentiation in neocortex, known as stimulus-selective response potentiation (SRP), because it is limited to a familiar stimulus. Both forms of plasticity and accompanying habituation are impaired by local knockdown of NMDA receptors in V1, indicating the involvement of bidirectional Hebbian synaptic plasticity. However, we also present evidence that inhibitory neurons play a key role in cortical familiarity and novelty detection. Notably, Parvalbumin-expressing inhibitory neurons are significantly more engaged by novel than familiar orientations while a different subclass of GABAergic neurons, the Somatostatin-expressing neurons, are more engaged by familiarity than novelty. We will also describe signature oscillations that are produced by familiarity or novelty which may be recorded non-invasively in EEG and likely serve as a proxy of the respective activity of these neuronal subtypes. Finally, we present observations of altered habituation and cortical dynamics in mouse models of neurodevelopmental disorders.

Conclusions:

A simple but fundamental form of cognition drives a variety of signals that are often aberrant in neurodevelopmental disorders, and the mouse provides a system to deeply understand their origins and dysfunction. Based on our results, we also believe that the potential exists in the future to record these signals non-invasively using EEG from human populations for patient stratification and assessment of response to treatment.

210.002 (Panel Discussion) Alterations to Excitation/Inhibition Balance at 10 Months of Age Are Associated with Increased Sensory Hypersensitivity in Cohorts Enriched for Neurodivergent Outcomes

(1)Institute of Psychiatry, Psychology and Neuroscience, King’s College London, London, UNITED KINGDOM, (2)Centre for Brain and Cognitive Development, Birkbeck, University of London, London, United Kingdom, (3)Institute of Psychiatry, Psychology and Neuroscience, King’s College London, London, United Kingdom, (4)Institute of Psychiatry, Psychology and Neuroscience, Institute of Psychiatry, London, UNITED KINGDOM, (5)Institute of Psychiatry, Psychology and Neuroscience, King’s College London, London, United Kingdom, (6)Institute of Psychiatry, Psychology and Neuroscience, King’s College London, London, United Kingdom, (7)Department of Psychology, University of Cambridge, Cambridge, United Kingdom, (8)Centre for Brain and Cognitive Development, Birkbeck University of London, London, United Kingdom, (9)Department of Psychology, Institute of Psychiatry, Psychology & Neuroscience, King’s College London, London, United Kingdom

Background:

Differences in sensory processing are highly prevalent in autistic populations, and there is some evidence of similar differences in attention deficit hyperactivity disorder (ADHD). However, the neural mechanisms that underpin these differences in sensory processing and experience remain unclear. One proposed mechanism is alterations in the relative balance of excitatory to inhibitory activity in sensory regions of the brain (E/I balance). While there is some evidence from neuroimaging and neurometabolite studies that alterations in E/I balance are associated with sensory hyper and hypersensitivity, most studies examined contemporaneous associations in older autistic populations, meaning inference about directionality of effects is limited.

Objectives:

To test whether alterations in E/I balance in the first year of life are contemporaneously and longitudinally associated with sensory hyper and hypersensitivity in cohorts of children enriched for neurodivergent outcomes.

Methods:
At-rest EEG was collected from a sample of 10-month infants (N=161); 29 typical likelihood (no family history of neurodevelopmental conditions), 80 elevated autism likelihood (family history of autism), 31 elevated ADHD likelihood (family history of ADHD) and 21 elevated autism+ADHD likelihood (family history of autism and ADHD). Metrics of hyper and hyposensitivity were calculated from the Infant and Toddler Sensory Profile (Dunn, 2002), which was completed by parents at 10, 14, 24 and 36 months. Scores were reversed such that a higher score indicates higher hyper/hyposensitivity.

We estimated E/I balance from pre-processed EEG using the Fitting Oscillations and One Over F algorithm (FOOOF; Donoghue et al., 2020). This equates to the exponent of log-frequency plotted against log-power (also referred to as 1/f), with a higher aperiodic exponent indicating a steeper slope and higher relative inhibition.

Analyses estimated a joint correlated latent growth curves model to capture the starting point (intercept) and trajectory of change (slope) for sensory hyper and hyposensitivity between 10-36 months, adjusting for individual differences in age at assessment at each timepoint (See Figure 1A). We entered elevated autism likelihood (present/absent), elevated ADHD likelihood (present/absent), gender, 10m aperiodic exponent and number of EEG trials as predictors of intercept and slope for hyper and hyposensitivity.

Results:

10m aperiodic exponent (b=.70, p<.01) and number of trials (b=-.45, p=.03) were associated with the intercept of hypersensitivity (Figure 1B). Models showed elevated autism likelihood was associated with a higher hyposensitivity intercept (b=.54, p<.01) but no effect on hyposensitivity slope (b=-.26, p=.09), and no effect on hypersensitivity intercept (b=.19, p=.34) but a steeper hypersensitivity slope (b=.66, p=.03) (Figure 2). ADHD likelihood was only associated with a steeper slope of hyposensitivity (b=.39, p<.01). There was a significant effect of gender, such that males had a higher intercept for hyposensitivity only (b=.57, p<.01).

Conclusions:

Results suggest higher inhibitory tone is associated with higher baseline hypersensitivity, whilst autism likelihood is associated with higher and more stable hyposensitivity and growth in hypersensitivity, and ADHD likelihood is associated with greater growth in hyposensitivity. Findings suggest early alterations to E/I balance and neurodevelopmental likelihood are differentially related to sensory modulation, and that associations with alterations to E/I balance are specific to hyper, rather than hyposensitivity.

210.003 (Panel Discussion) Infant Neural Sensitivity to Eye Gaze and Later Emerging Autistic Traits in Tuberous Sclerosis


Background:

Up to 60% of individuals with tuberous sclerosis complex (TSC) meet diagnostic criteria for autism. While several clinical features correlate with autism in TSC, the specific mechanisms underlying variability in developmental outcome are yet to be clearly defined. An increasing proportion of TSC cases are identified prenatally, providing a unique opportunity to study developmental pathways to autism from infancy. Accumulating evidence from infants who have an elevated familial likelihood for autism suggests altered face and gaze processing precedes and predicts autism diagnosis. While atypical face processing has been reported in older children and adults with TSC, the profile of face processing in infancy and extent of homology with infants with elevated non-syndromic likelihood remains unclear.

Objectives:

This study aimed to: (1) characterise neural processing of faces and gaze in infants with TSC compared to infants with elevated non-syndromic likelihood for autism; (2) identify predictors of emerging autistic traits in infants with TSC.

Methods:

Infants with TSC were recruited from the Early Development in Tuberous Sclerosis (EDiTS) Study (n=12, mean chronological age (CA): 10.75 months) and compared to infants with (elevated familial likelihood, EFL; n=169; mean CA: 8.21 months) and without (typical
likelihood, TL; n=77, mean CA: 7.88 months) an older sibling diagnosed with autism. We recorded infants’ face-sensitive event-related potentials (ERPs) in response to viewing: 1) faces versus visual noise stimuli; (2) static gaze (faces with direct versus averted gaze); 3) dynamic gaze shift (eye gaze directed toward versus away from the infant). Cognitive ability was assessed using the Mullen Scales of Early Learning and secondary analyses matched groups according to mean nonverbal mental age (MA; unadjusted TSC: 8.96 months; EFL: 9.47 months; TL: 9.86 months). The Vineland Adaptive Behavior Scales and the Quantitative Checklist for Autism in Toddlers were administered to parents at 24 months.

Results:

Infants with TSC demonstrated longer ERP latencies to face stimuli across conditions and across the time-course of neural processing of faces (P1, N290, P400) compared to infants with EFL and TL. Infants with TSC and EFL showed a reduced effect of dynamic gaze shifting away versus towards the infant on P400 amplitude, compared to TL [F(2, 74)=4.5, p=.01]. Findings were retained when groups were matched on non-verbal MA and were not associated with epilepsy severity. The reduced effect of gaze shifting on P400 amplitude was associated with lower socialisation scores on the VABS (r=.62, p<.05) and increased autistic traits on the QCHAT at 24 months (r=-.50, p<.05) in the TSC group only.

Conclusions:

Infants with TSC show slower speed of face processing and reduced detection of dynamic gaze shifts, suggesting altered specialisation for gaze processing. The findings replicate previous work in infants with non-syndromic likelihood for autism and extend to syndromic populations, suggesting a candidate convergent pathway across aetiologicaly distinct groups. Importantly, atypical gaze processing is a potential predictive marker of emerging autism in TSC, which may aid in targeting early intervention and providing a read-out of treatment efficacy.

210.004 (Panel Discussion) EEG Markers of Inhibitory and Excitatory Function in Children with Genetic Conditions and Autism

S. Lippe, E. Anagnostou, M. Proteau-Lemieux and I. S. Knoth, (1)Neurosciences of Early Development Lab, CHU Sainte-Justine, Montreal, QC, Canada, (2)Autism Research Centre, Bloorview Research Institute, University of Toronto, Toronto, ON, Canada, (3)CHU Sainte-Justine Research Center, Neuroscience of Early Development lab, Montreal, QC, Canada

Background:

Genetic conditions alter molecular pathways and neural circuitry dynamics during development. A greater understanding of the neurophysiological dynamics of the brain caused by genetic mutations associated with neurodevelopmental disorders is needed. It could enable us to assess, in vivo, the signatures of the mechanisms altered in neurodevelopmental disorders. Over the last few years, we investigated the brain signal of several neurodevelopmental disorders of genetic origins to verify whether patterns of similarities map to specific genetic mutations or behavioral symptoms. Electroencephalography (EEG) is a high-time-resolution method to evaluate brain signal dynamics non-invasively. Several metrics, sensitive to developmental and clinical conditions, can be extracted from the signal.

Objectives: This presentation aims to reveal the metrics extracted from resting-state EEG that are most relevant to NF1, FXS, and ASD.

Methods: FXS (N=41), ASD (N=68), NF1 (N=27), and neurotypicals (N=78) from 6 to 30 years old have been recorded with high-density EEG while performing a series of tasks and during resting. Resting-state data were preprocessed using EEGLab and the 1/f aperiodic, frequency bands power density, alpha peak frequency, connectivity (wPLI), and multiscale entropy (MSE) were extracted.

Results: Results suggest shared alterations in FXS, and ASD children in gamma powers compared to neurotypicals (p<0.0001). High MSE scales were reduced in FXS and ASD and are sensitive to the level of functioning (IQ) (p<0.013). Alpha peak frequency and connectivity show mixed results in the different populations.

Conclusions: While some EEG metrics are similarly altered in the clinical groups, others may relate to symptomatology. Stratification of the data will enable more specific portraits of altered EEG metrics in these neurodevelopmental conditions.

PANEL DISCUSSION — TRANSLATIONAL NEUROSCIENCE

224 - Sleep and Sensory Processing in Autism: Translational Insights

Panel Chair: Emily Jones, Centre for Brain and Cognitive Development, Birkbeck University of London, London, United Kingdom
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Sleep problems are common in autistic people and can significantly impact mental health and quality of life, but remain poorly understood. Sleep is a domain that is well-suited to a translational approach, since sleep/wake cycles can be studied using comparable paradigms across the lifespan and in animal models; this provides potential new routes to treatment for sleep problems. We present four datasets that provide converging evidence of the aetiological relevance of sleep differences in autism. Ostergaard shows that neurexin1-deficient mice (a genetic change that is commonly associated with autism) show differences in both sleep quantity and quality. Begum-Ali shows that differences in sleep emerge by 14 months in infants with later autism, and predict both autistic traits and behavioral measures of sensory hypersensitivity in toddlerhood. Oakley shows that children with genetic syndromes linked to autism (PMS) show reduced sleep at night. Finally, Kyllainen presents data on the acceptability and feasibility of interventions targeted at supporting sleep for toddlers with emerging autistic traits. Taken together, our work shows that sleep is a translationally-relevant domain that is altered in both genetic models of autism, in infants prior to symptom onset, and children with genetic syndromes, and is a tractable target for intervention.

224.001 (Panel Discussion) Sleep and Sensory Processing in the Nrxn1α-Deficient Mouse Model

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Background:

Altered sensory processing is an integral part of the autism spectrum disorder (ASD) diagnosis. Especially various forms of habituation seem be affected, thus, both hyper- and hypo-sensitivity has been reported in humans. The underlying mechanisms are not well-elucidated. A number of risk genes have been suggested for ASD, one of which is NRXN1. Nrxn1 is a well-conserved gene across species and one of the largest genes in the human genome. Parts of this gene have been found to be deleted in several autistic people. It encodes a presynaptic cell-adhesion molecule and is believed to act in synaptic transmission. Previous studies have found a discrete electrophysiological phenotype, in the form of a change in excitatory currents, in Nrxn1α gene knock-out mice (Etherton et al., 2009).

Objectives:

In this study we explore sensory processing and sleep in neurexin-1α deficient mice using electrophysiology.

Methods:

The groups were male mice of the following genotypes: wildtypes (WT) n=14, homozygous knock-out (KO) n=14 and heterozygous knock-out n=13 (Het). All had electrodes implanted in the visual and auditory cortices. The electrophysiological activity was recorded with wireless Taini (Jiang et al., 2017) transmitters at the age of 10 weeks and again at the age of 22 weeks. The animals were exposed to gating paradigms of light flashes and tones presented at different inter-stimulus-intervals.

Spontaneous activity was recorded for four hours in the home cage environment. Semi-automatic scoring was carried out with custom scripts in matlab. Statistics were carried out using estimation statistics and the DABEST package in R studio.

Results:

The results showed the full-KO being sensitized to light flashes compared to the WT. The results from the auditory paradigm showed the heterozygous KO exhibiting more gating than both the full-KO and the WT.

Recording of spontaneous activity with subsequent scoring revealed statistically significant changes in the proportion of time spent in each state, see the figure below. The delta-dominated awake state was increased in both the heterozygous 0.147 [95CI: 0.0582; 0.254] and the homozygous knock-out 0.131 [95CI: 0.0414; 0.218] at the age of 22 weeks, where the delta-dominated slow wave sleep was decreased in both genotypes and at both ages (Het (-0.0636 [95CI: -0.106; -0.0246]) at w10 and (-0.0861 [95CI: -0.137; -0.0377]) at week 22, KO was decreased (-0.103 [95CI: -0.15; -0.0524]) at week 10 and (-0.139 [95CI: -0.181; -0.101]) at week 22). REM sleep was decreased at the later age in both Het (-0.0711 [95CI: -0.115; -0.0249]) and KO (-0.0685 [95CI: -0.111; -0.0299]). Curiously, then the fast NREM was increased in the homozygous knock-out at both ages (week 10 (0.0352 [95CI: 0.00446; 0.069]) and week 22 (0.032 [95CI: 0.003; 0.0594]). Overall, there would be an expectation of decreasing amounts of sleep with age, however the wildtypes did not differ significantly across time.

Conclusions:

Taken together this suggests hyperexcitability caused by knocking out Nrxn1, and this in turn affects not only the over-all amount of sleep, but also the composition of sleep.
Sleep Onset Problems in Infancy Associates with Later Increased Sensory Sensitivity and Autism Spectrum Disorder Symptomatology


Background:
Sleep problems have been implicated in neurodevelopmental disorders, such as Autism Spectrum Disorder (ASD), persisting from early development to adulthood (Rydzewska et al., 2020). Previous research examining prospective longitudinal cohorts have found that infants with a family history of ASD, and those that go on to have an ASD diagnosis, demonstrate reduced levels of night sleep (i.e., reduced sleep durations, increased night awakenings and increased sleep onset problems), with reduced night sleep in infancy associating with later increased ASD symptomatology and reduced social communication skills (Begum Ali, Gosse et al., in press; MacDuffie et al., 2020). Further, sleep disturbances in ASD cohorts have been associated with increased sensory atypicalities (e.g., Holway et al., 2013; De Laet et al., 2022). As such it is important to examine sleep in development and its relation to emerging sensory differences.

Objectives: To examine sleep and sensory behaviours concurrently and longitudinally in the first 2 years of life in infants and toddlers with a family history of ASD.

Methods:
We collected parent-report questionnaires from a sample of 247 infants; 170 infants with an elevated likelihood of ASD (ASD-L) and 77 infants with a typical likelihood of ASD (TL). We assessed sleep using the Infant Sleep Onset Problem score (ISOP; MacDuffie et al., 2020) derived from the Infant Behaviour Questionnaire Revised (Putnam et al., 2014) at 4, 6-10 and 12-15 months of age. To examine sensory behaviours, we used the Perceptual Sensitivity subscale (PSS) from the IBQ-R (4-15 months) and the Early Childhood Behaviour Questionnaire (24-months; Putnam et al., 2006).

Results:
Sleep Onset Problems did not vary by familial likelihood of ASD \(F(1, 314) = .25, p = .62\) or ASD Outcome at 3 years \(F(1, 403) = 1.31, p = .25\). To investigate the relationship between sleep and sensory behaviours, we used a cross lagged structural equation model. We found that increased Sleep Onset Problems at 12-15 months associated with increased Perceptual Sensitivity at 2 years \(\beta = .14, p = .03\) and increased ASD symptomatology (Social Responsiveness Scale scores: \(\beta = .2, p = .004\)) at 3 years; see Figure 1.

Conclusions:
Our findings show that increased levels of sleep problems in infancy associate with increased sensory sensitivity and ASD symptomatology in toddlerhood. Interestingly, we find no group differences in the sleep measure used.

Sleep Profiles and Their Association with Clinical Features in Individuals with Rare Synaptic Gene Conditions from the AIMS-2-Trials Synaptic Gene Study (SynaG)


Background:
GABA and glutamate are critical for maintaining excitation/inhibition (E/I) balance in the brain, and are also involved in sleep and wake regulation (Ballester et al., 2020). Altered synaptic biology is implicated in autism, which may in turn contribute to changes in sleep-wake
mechanisms (Bourgeron 2007; Tong et al., 2016). The Synaptic Gene Study assesses autism-related synaptic gene conditions, or synaptopathies, to better understand underlying biological mechanisms that may contribute to autistic traits and associated features (Cooke et al., 2022). Disturbances in sleep have been reported in synaptopathies such as Phelan McDermid Syndrome (PMD; Smith-Hick et al., 2021; Bro et al., 2017), however, their relationships with autistic features and functional outcomes have not yet been explored.

Objectives: We characterise sleep profiles of individuals with PMD (compared to matched autistic/typically developing individuals) and how sleep behaviours relate to autistic features and functional outcomes.

Methods: 54 individuals aged 1-19-years (16 Phelan-McDermid Syndrome, 21 idiopathic autistic, 17 neurotypically developing individuals matched for mental age) were included in this analysis. Sleep behaviour and disturbance was assessed using the parent-report Children's Sleep Habits Questionnaire (CSHQ). Autistic traits were measured using researcher-rated Autism Diagnostic Observation Schedule – 2nd Edition (ADOS-2)/Autism Diagnostic Interview – Revised (ADI-R); and the Sensory Experiences Questionnaire (SEQ) for sensory processing differences. Adaptive functioning was measured using the Vineland Adaptive Behaviour Scales – 2nd Edition (Vineland-II); and frequently co-occurring mental health features via the REISS scales (anxiety/depression scores) and Aberrant Behaviour Checklist (ABC; irritability/hyperactivity scores). Analyses were conducted to establish a) sleep profiles across the cohort, and whether these differed by subgroup; and b) associations between sleep behaviours/ disturbance with autistic traits, particularly sensory features

Results: NTD children slept more at night (Mdn = 11 hours, \( p = .01 \)) than their PMD (Mdn = 10 hours) and iAutism (Mdn = 9.5 hours) counterparts. Between 48-50% of PMD and iAutistic parents reported their child getting too little sleep as problematic, versus 0% of NTD parents. 19% of iAutism parents reported that their child frequently struggled at bedtime, versus 6% of both PMD and NTD parents. 28% of Autism versus 13% and 6% of PMD and NTD parents respectively, considered the bedtime struggles they experience to be problematic. Total sleep disturbance did not differ between groups (\( p = .162 \)), but was positively associated with sensory experience (\( r(41) = .440, p < .01 \)) and hyperactivity (\( r(54) = .229, p = .028 \)).

Conclusions: Our results show, for the first time, that increased sleep disturbances in a matched sample of individuals with PMD, iAutism and NTD associate with sensory sensitivities and hyperactivity, as perceived by parents. While both PMS and iAutism groups were reported to be getting too little sleep on average, as compared to their NTD peers, the iAutism group were reported to have the most sleep difficulties across the groups. This provides support to the hypothesis that altered synaptic biology implicated in autism may influence sleep-wake mechanisms but that other factors (including e.g., parental perceptions of sleep difficulties) may also be relevant when working with questionnaire-rated sleep data.

224.004 (Panel Discussion) Feasibility Study of Brief Parental Sleep Guidance for Toddlers with Prodromal ASD
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Background: Sleep problems are common in ASD and are among the first concerns of parents whose toddlers are likely to develop autism spectrum disorder (ASD). It seems essential to offer parental support as early as possible, in the hope of preventing sleeping difficulties from becoming more severe and/or longstanding. Studies of sleep support for parents of toddlers with prodromal ASD are, however, sparse although there is research evidence of effective behavioural sleep interventions for autistic children and typically developing toddlers.

Objectives: This study obtains feasibility data of the brief parental sleep guidance for toddlers with prodromal ASD at a stage before formal diagnoses. The specific aims are to investigate the practical feasibility of the procedure, evaluate the developed fidelity measures, and gather a participatory view of the guidance.

Methods: To date, parents of three toddlers with prodromal ASD have participated in our ongoing feasibility study. The sleep guidance is implemented as a part of the Gaze@Toddler project, in which toddlers are screened from the general population at the age of 16-18 months using a parental questionnaire (M-CHAT-R/F). The guidance consists of three in-person (60 min) and two remote (45min) sessions over three months (Fig 1). The interventionists are (neuro)psychologists and MDs specialised in paediatric sleep medicine. The feedback for feasibility purposes was gathered both from the parents and the interventionists. There were two fidelity rating scales completed by researchers assessing: 1) the interventionists’ delivery of the guidance and 2) the parents’ adherence to the guidance. The parents’ fidelity assessment also included evaluation of how the sleep diary was filled for each session.

The guidance is focused on supporting 1) diurnal rhythm, 2) regular bedtime routines and 3) the ability for self-soothing. The specific techniques are derived from previous studies (e.g., Sleeping Sound), such as a camping out, bedtime fading and visual support for bedtime routines (Fig 1).
Results: The number of sessions and their content were accessible and appropriate, according to both the parents and the interventionists. The parental feedback of the sleep guidance was very positive. They felt that the principles were easy to follow, and they were highly motivated to participate in the guidance. However, parents were divided in their opinions about the inclusion of remote sessions; some considered them to be ineffective, but others favoured the remote delivery as it was easier to fit within their hectic family lives. The fidelity scale for the interventionists was reported to be easy for the researchers to complete but the fidelity scale about the parents’ adherence needed modifications, being too complicated for the interventionist to complete. The parents were motivated to fill out the sleep diary.

Conclusions: The feasibility study of sleep guidance for parents of a toddler with prodromal ASD suggests high acceptability to the parents and interventionists. The acceptability of remote sessions was less clear, and results will be monitored as more parents participate in the feasibility study. A simplified version of the parent fidelity scale is being developed.